CHAPTER III

TRANSITION OF TECHNOLOGY TO THE JOINT WARFIGHTER

The cold war acquisition process produced some of the world's best military equipment. That process, however, is too expensive, and the time from concept to fielding is too long for the post-cold war budgetary and geopolitical environment. Three important mechanisms—Advanced Technology Demonstrations (ATDs), Advanced Concept Technology Demonstrations (ACTDs), and Joint Experiments (JEs)—are used to ensure the transition of innovative concepts and superior technology to the warfighter and acquisition customer both faster and less expensively than by the traditional means. Each of these mechanisms is described below.

A. ADVANCED TECHNOLOGY DEMONSTRATIONS

Service and agency ATDs seek to demonstrate the maturity and potential of advanced technologies for enhanced military operational capability or cost effectiveness. The DTO volume for the JWSTP and the DTAP presents summary descriptions of the ATDs cited in this plan. ATDs are characterized by four parameters:

- Large scale, both in resources and complexity
- Operator/user involvement from planning to final documentation
- Specific cost, schedule, and performance metrics
- A clearly defined transition target.

B. ADVANCED CONCEPT TECHNOLOGY DEMONSTRATIONS

The ACTD process was initiated in 1994 to permit the early and inexpensive evaluation of mature advanced technologies. The evaluation is accomplished by the warfighter to determine military utility and to develop the concept of operations that will optimize effectiveness. ACTDs are structured and executed so that, when successful, we are able to proceed rapidly into formal acquisition.

By introducing new technologies in the field prior to the initiation of formal acquisition, we allow our operators, who have experience in combat, to evaluate and assess the military utility and develop the tactics to ensure that we can realize the full potential of the substantial technology base that is available to us—both defense and commercial. ACTDs are not a means by which to circumvent the formal acquisition process, but rather a means to enter that process based on a user assessment of the value of the new capability that reduces the user acceptance risk. This process will help us make more informed acquisition decisions and improve our acquisition cycle time.

ACTDs are designed to transfer technology rapidly from the developers to the users. They are user oriented and represent an integrated effort to assemble and demonstrate a significant, new or improved military capability that is based on mature advanced technologies. They also are on a scale large enough to demonstrate operational utility and end-to-end system integrity. A demonstration is jointly developed and implemented by the operational user and materiel development communities as key participants. ACTDs allow the warfighter to:

- Evaluate a technology's military utility before committing to a major acquisition effort.
- Develop concepts of operation for employing the new technology.
- Retain a low-cost residual operational capability if the commander desires.

Upon the conclusion of an ACTD, one of the following three choices will be made based on the results of the exercises:

- Execute the transition of the demonstrated technology directly to the warfighter. Only minor, or perhaps no, modifications to the existing equipment will be required. This transition approach is particularly appropriate where only small quantities of the new equipment are required.
- Based on lessons learned during the ACTD, enter the formal acquisition process at the appropriate milestone.
- Terminate the efforts or restructure them based on the evolved concept of operations and lessons learned during the ACTD.

Over the past 6 years, ACTD proposals have been forwarded from the Joint Staff, unified commanders, and military services. Suggestions have been received from industry and many DoD research and development agencies.

ACTDs come in all shapes and sizes. Some are just a few months in length and evaluate a very specific technology or address a particular mission area; others are several years long and include coordination of multiple developing technology programs into a series of specific demonstrations. Although no two ACTDs are alike, and proposals are accepted at any time of year, there are some key points to consider before submitting a proposal:

- *Ensure that the ACTD addresses current or emerging military needs.* Some ACTDs deal with immediate military needs, such as the Counter-Sniper ACTD; others explore emerging capabilities, such as the Information Operations Planning Tool ACTD.
- *Ensure that the ACTD evaluates relatively mature technologies*—that is, technologies whose technical feasibility and technical risk are understood and have been demonstrated. The ACTD evaluates the operational application and military utility of the technologies.
- *Ensure that the ACTD includes maximum user participation.* A key objective of each ACTD is to determine the potential military utility of the technologies and to recommend whether further procurement is warranted. Each ACTD is a balance between operational needs and technological opportunity and requires close coordination and teaming between operators and developers.

ACTDs that examine the potential of specific technologies to address immediate or urgent needs can be submitted at any time. All ACTD proposals, including recommendations on potential participants, are coordinated between the Under Secretary of Defense (Acquisition and Technology) (USD(A&T)) and the Vice Chairman of the Joint Chiefs of Staff, based on prioritization from the Joint Requirements Oversight Council (JROC) and reviews by the ACTD "Breakfast Club." The submission process for in-cycle ACTDs is generally accomplished in accordance with the following annual schedule:

- By the middle of January, all ACTD proposals are submitted to the Deputy Under Secretary of Defense for Advanced Systems and Concepts (DUSD(AS&C) by the services, joint staff, and various agencies.
- Beginning in the middle of February, DUSD(AS&C) conducts feasibility checks and assembles one- to three-page descriptions for each of the ACTD candidates. Following an initial scrub of the programs, the list is pared down to approximately 25 candidates.
- Starting in April, ACTD Breakfast Club briefings are given to review each of the candidates. In grading each ACTD, the Breakfast Club considers risk in the following categories: technical, management, funding, and ACTD suitability.
- DUSD(AS&C) briefs the JROC Review Board and the JROC on the remaining candidates. Following this briefing, the JROC prioritizes the ACTD candidates. This prioritization process includes inputs from all CINCs, services, and Joint Warfighting Capability Assessment teams.
- The final scrub process (an in-depth review of each remaining candidate) is conducted through the middle of September, at which time DUSD(AS&C) makes the final ACTD selection. Following coordination with the Vice Chairman, Joint Chiefs of Staff, and the USD(A&T), DUSD(AS&C) announces the final ACTD selections during the middle of October.

Out-of-cycle ACTDs are reviewed and initiated on a schedule established on a case-by-case basis.

The DUSD(AS&C) recently announced the selection of 11 ACTDs for FY00. In FY95, the Department of Defense initiated the first 11 ACTDs. Ten ACTDs were initiated at the beginning of FY96, and two more were added later in the fiscal year. During FY97, seven ACTDs were initiated at the beginning of the fiscal year, and two more were added later in the year. In FY98, 14 ACTDs were initiated at the beginning of the fiscal year as were 11 more early in FY99. These ACTDs leverage in excess of $1 billion in military service and DoD agency technology programs.

The tabulation immediately following this section provides brief summaries of the 57 ACTDs that were initiated from FY95 through FY99. Twenty-two of these have been completed.

The newly selected FY00 ACTDs are in the congressional reporting process. The titles of these 11 FY00 ACTDs are as follows:

- CINC 21
- Coalition Aerial Surveillance and Reconnaissance (CAESAR)
- Communication/Navigation Outage Forecasting System (C/NOFS)
- Computerized Operational MASINT Weather (COMWx)
- Content-Based Information Security (CBIS)
- Ground-to-Air Passive Surveillance (GAPS)
- Joint Intelligence, Surveillance, and Reconnaissance (JISR)
- Multiple-Link Antenna System (MLAS)
- Quick Bolt
- Restoration of Operations (RestOps)
- Tri-Band Antenna Signal Combiner.

The DUSD(AS&C) web site [*http://friends.acq.osd.mil/at*] and the ACTD Master Plan (Reference 7) provide more details of the ACTD implementation process and the individual ACTD programs. The DTO volume (Reference 6) for the JWSTP and the DTAP presents summary descriptions for all ACTDs cited in this plan.

ADVANCED CONCEPT TECHNOLOGY DEMONSTRATIONS

ONGOING ACTDS

***Adaptive Course of Action (ACOA)* (User Sponsors: U.S. Joint Forces Command, U.S. Pacific Command), DTO F.24**

Purpose: To demonstrate Web-based planning tools to cut initial crisis action response time by 50 percent and allow joint planning by multiple participants during crisis action planning. Participants, including the supported Commander in Chief (CINC), supporting CINCs, and commanders of joint task forces, will use a shared representation of the pieces of the plan and will be able to simultaneously view those pieces as they evolve in plan options and fidelity. The goal is to provide a mission-focused link among operations, logistics, and intelligence elements, as well as a shared dynamic workspace for situational assessment. Planners and executors will immediately understand changes in the assumptions on which their plans are based.

***Battle Damage Assessment (BDA) in the Joint Targeting Toolbox (JTT)* (User Sponsors: JCS/J2–T and U.S. Central Command), DTO B.29**

Purpose: To provide the warfighter with a significant BDA capability by combining battle damage indicators, observed physical damage, and inferred functional damage into an accurate assessment of combat operations. The BDA in JTT ACTD incorporates advances in artificial intelligence and decision aiding, especially evidential reasoning and case-based reasoning, to provide a more accurate assessment of combat operations. It addresses the four technical aspects of BDA: data acquisition, results analysis, data aggregation, and visualization. The system will provide the theater/Joint Task Force (JTF) commander with a joint BDA and targeting process to correct current limitations. The ACTD will directly result in significant operational improvements to both the planning and targeting communities.

***Battlefield Awareness and Data Dissemination (BADD)* (User Sponsor: U.S. Joint Forces Command), DTO A.07**

Purpose: To develop and evaluate a software-based system that addresses the problem of information overload. BADD employs information agents and modern search engine technology to characterize and retrieve information contained in Secret-level National Imagery and Mapping Agency (NIMA), DIA, and DoD databases far more accurately than commercially available Internet Web browsers. Users have the ability to create information profiles that are used by the system to automatically search databases and deliver information in accordance with the prescribed schedule. BADD also allows commanders to allocate bandwidth to functions or units just as they allocate more traditional sources of combat power. BADD has provided the Global Broadcast System (GBS) program software for broadcasting the common operational picture (COP) and lessons learned that led to important changes in the GBS Phase II architecture. BADD software components are in the process of transitioning to the Defense Information Systems Agency (DISA) Information Dissemination Management program and NIMA's video archive program.

***C^4I for Coalition Warfare* (User Sponsor: U.S. European Command), DTO A.23**

Purpose: To develop a modular software package that will allow standard U.S. messages to be translated to a NATO standard message format, and allow data to be passed directly between U.S. databases and those of allied countries. The capability increases the speed and accuracy of U.S.-to-NATO communications by eliminating the "sneaker net" between allied command and control systems. The software is designed to be compliant with DISA Common Operating Environment (COE) standards so it can be used by any service system that is Global Command and Control System (GCCS)/Defense Information Infrastructure (DII) COE compliant.

***Coherent Analytical Computing Environment (CACE)* (User Sponsor: U.S. Pacific Command), DTO F.25**

Purpose: To demonstrate advanced data warehousing concepts, online analytical processing decision support, and intelligent analytical computing tools to access and utilize joint aviation asset information. The application of such technologies is expected to ensure global access to joint aviation asset information, enhance aviation safety, reduce DoD investment in inventory, increase unit readiness, and provide benefits in all types of operational settings. CACE will use an AV–8B (Harrier aircraft) Marine Air Group to demonstrate the technologies.

***Common Spectral MASINT Exploitation (COSMEC)* (User Sponsors: U.S. European Command, U.S. Pacific Command), DTO M.11**

Purpose: To demonstrate the tactical utility of spectral measurement and signature intelligence (MASINT) products to the warfighter by providing processing capability to exploit data from government and commercial multi/hyperspectral collection platforms. COSMEC supports both tactical and strategic intelligence, using state-of-the-art MASINT processing and exploitation algorithms. COMSEC also supports a variety of operational requirements, including detection and identification of camouflaged vehicles, search and rescue, terrain characterization and mapping, beach route preparation, submarine detection, counter-drug operations, and detection of chemical/biological weapons.

***Compact Environmental Anomaly Sensor II (CEASE II)* (User Sponsor: USAF Space Command), DTO A.29**

Purpose: To evaluate the utility of integrating small sensors onboard a satellite to monitor the space environment. Operators will be better able to understand the cause of solar storm disruptions and be able to mitigate or prevent their effects. This allows more optimal warfighter use of the satellite, assists in preventing permanent damage to satellite components, and offers insight into the origin of the satellite disruption.

***Counterproliferation II* (User Sponsor: U.S. European Command), DTO J.04**

Purpose: To build on the success of Counterproliferation (CP I). Whereas CP I focused on precision-guided gravity weapons, CP II focuses on (1) standoff penetration with enhanced warhead penetration performance and fuzing options for the Conventional Air-Launched Cruise Missile (CALCM) and Tactical Tomahawk Penetrator Variant (TTPV) systems and (2) attack planning, including more accurate target damage and collateral effects capabilities and predictions and new deliberate and contingency target planning capabilities. In addition, CP II will contribute to the evolution of U.S. European Command's CP counterforce concept of operations (CONOPS). Three CP II ACTD demonstration series are planned over the period of FY2000–2003 to provide the operational sponsor and participating commands with opportunities to assess the utility of the selected technology components against the CONOPS.

***Extending the Littoral Battlespace (ELB)* (User Sponsor: U.S. Pacific Command), DTO M.02**

Purpose: To demonstrate an enhanced capability to enable rapid employment, maneuver, and fire support from the sea of dispersed units operating in an extended littoral battlespace. This is made possible through the Wide Area Relay Network (WARNET), which consists of a packet backbone radio (VRC–99A), airborne relays, and an IEEE 802.11 wireless local area network (WaveLAN). A proof-of-concept (military utility) demonstration was held in April 1999. There is strong operational support for the new capability. The U.S. Navy requested that a portion of this capability be installed on deploying Pacific Fleet Amphibious Ready Groups (ARGs) or Marine Expeditionary Units (MEUs) to permit additional real-world testing. Transition work has begun with numerous programs of record, including the U.S. Marine Corps Unit Operations Center program. During FY2000, several system tests and demonstrations will be conducted.

***Force Medical Protection/Dosimeter* (User Sponsors: U.S. Joint Forces Command), DTO L.12**

Purpose: To provide the capability to determine the exposure of the individual warfighter to chemical/biological (CB) agents by developing an individually worn sampler. The first phase of the ACTD emphasizes CONOP development using commercial off-the-shelf (COTS) products for collection and archiving of exposure to chemical agents using passive sampling methodology. The second phase of development provides real-time analysis to warn the wearer to an immediate chemical hazard and the capability to trap biological pathogens for later analysis.

***High-Altitude Endurance Unmanned Aerial Vehicle (HAE UAV)* (User Sponsor: U.S. Joint Forces Command), DTO A.10**

Purpose: To demonstrate the utility of an HAE UAV reconnaissance and surveillance capability to fulfill DoD long-dwell, intelligence, surveillance, and reconnaissance requirements. Global Hawk is a conventional air vehicle designed for reliable, long-endurance, high-altitude, standoff image collection capabilities. It is also designed to operate in low to moderate air defense threat environments with the ability to fly above, stand off, and look into high-threat areas using electro-optical (EO), infrared (IR), and synthetic aperture radar (SAR) sensors. The Common Ground Segment (CGS) consists of a Launch and Recovery Element (LRE), a Mission Control Element (MCE), and associated communications, The LRE prepares, launches, and recovers the air vehicle. The MCE plans and executes the mission, dynamically retasks the air vehicle (including the sensors), and processes, stores, and disseminates the data as required. Exploitation occurs through existing and planned DoD systems and installations. The HAE UAV system is proving compliant with a number of imagery exploitation systems, such as the Common Imagery Ground/Surface System (CIG/SS). As of November 1999, Global Hawk has completed 39 flights (460 hours), 14 of which have been flown as part of the operational demonstration phase of the ACTD.

***HUMINT Intelligence and Counterintelligence Support Tools (HICIST)* (User Sponsors: U.S. Special Operations Command/Defense Intelligence Agency), DTO A.31**

Purpose: To provide mature commercial and government off-the-shelf technology to DoD human intelligence (HUMINT) and counterintelligence (CI) personnel. The objective of this ACTD is to develop, integrate, and demonstrate the technologies, concepts, and architectures to meet requirements for improving all-echelon satisfaction with HUMINT and CI targeting, collection, and dissemination. HICIST completed its first military utility assessment in which special operation forces, CI, HUMINT, and long-range surveillance operators, including National Guard and Reserve, evaluated several targeting, collection, and dissemination technologies in exercise scenarios relevant to their respective missions. This assessment resulted in the termination of two technologies and the identification of improvements that will be made in the remaining technologies before residual deployment; the evolution of CONOPS and techniques, tactics, and procedures; improvements in cross-echelon linkages; and new procedures for institutionalizing ACTD exercise lessons-learned in a plan of instruction.

***Information Assurance: Automated Intrusion Detection Environment (IA:AIDE)* (User Sponsor: U.S. Strategic Command), DTO A.26**

Purpose: To develop the means for determining whether hacker attacks are singular events or part of greater information attack against DoD information systems. Each post, base, or station employs a number of products such as sensors, firewalls, and intrusion detection systems, to provide protection for their network and computer systems. IA:AIDE provides network administrators the means to correlate information captured by these individual commercial systems and to automatically forward attack alerts to CINC, service, and DISA Computer Emergency Response Teams. IA:AIDE provides the ability to capture all this information in one searchable database. The system is incorporating current and maturing intrusion sensing tools in conjunction with expert systems technology and is being executed in coordination with DARPA information assurance programs.

***Information Operations Planning Tool (IOPT)* (User Sponsor: U.S. Central Command), DTO A.25**

Purpose: To provide information operations (IO) planning, modeling, and analysis tools supporting the target nomination process. These automated tools, operating at the compartment level, provide analysts at the CINC and service components a collaborative method to analyze strategic-level direction, convert the direction into specific IO tasks, and postulate and model the effects of non-kinetic options. The tool set is initially focused on supporting information operations against enemy air defenses but is being developed to support a broad range of strategtic- and operational-level information operations.

Integrated Collection Management (ICM) **(User Sponsor: U.S. Joint Forces Command), DTO A.05**

Purpose: To develop software and processes to improve the management of intelligence collection assets for the Joint Task Force (JTF) Commander. ICM will integrate management of space-based and airborne signals intelligence (SIGINT) and imagery sensors. The tools will also assist the collection manager in synchronizing his plans with the operational plan of the JTF Commander. The ICM tools will be demonstrated in total with the U.S. Joint Forces Command. Parts of the system have already been deployed to the National Military Intelligence Center in the Pentagon.

Joint Advanced Health and Usage Monitoring System (JAHUMS) **(User Sponsor: N/A), DTO F.18**

Purpose: To enable a change in maintenance philosophy for DoD helicopters. JAHUMS provides a means to monitor the heath and usage of individual aircraft using onboard sensors and diagnostics. It is demonstrating an open architecture so that modules from multiple vendors can be inserted into a baseline system. The baseline system is a commercial, dual-use system that is scalable to meet the specific requirements of a given helicopter or operator. The condition-based maintenance effort in an automated maintenance environment will use conventional wired sensors as well as advanced wireless sensors integrated into the JAHUMS open architecture. JAHUMS will generate significant life-cycle cost savings and dramatically reduce Class A mishaps on the aging helicopter fleet. Anticipated benefits include reduced maintenance costs and increased aircraft availability and safety.

Joint Biological Remote Early Warning System (JBREWS) **(User Sponsor: U.S. European Command), DTO I.02**

Purpose: To demonstrate an operationally capable biological remote early warning system for use by deployed ground forces in a mobile environment. This system provides both warning of a biological attack and reporting of the threat to appropriate command and control nodes. JBREWS will detect up to eight biological warfare (BW) agents. It will provide brigade/JTF area commanders with the capability to accelerate the decision cycle to warn and protect U.S. forces. JBREWS completed the Short-Range Standoff Detection System development test in late FY 1999 and will integrate biological detection technologies with the C^3 architecture early in FY2000.

Joint Continuous Strike Environment (JCSE) **(User Sponsor: U.S. European Command), DTO B.07**

Purpose: To reduce the latency associated with correlating command guidance, weapon status, targets, and airspace deconfliction. This technology makes it possible to attack time-sensitive surface targets. JCSE optimizes weapons for a four-dimensional battlespace by providing the software glue to combine actionable targets emerging from the intelligence, surveillance, and reconnaissance (ISR) processing, exploitation, and dissemination path with command objectives and guidance from the operational planning and execution process. JCSE then supplies weapon status information both horizontally and vertically across a Joint Force Commander's (JFC) organization to pair weapons with targets based on availability rather than organizational ownership. Finally, JCSE generates options for rapid deconfliction of airspace to ensure timely attack and to minimize hazards to friendly systems. Military utility assessments are occurring in Fleet Battle Experiments Foxtrot (November 99) and Golf (May 99), Joint Expeditionary Force 00, and Ulchi Focus Len (September 2000).

Joint Logistics **(User Sponsors: U.S. Joint Forces Command), DTO F.19**

Purpose: To develop and migrate interoperable Web-based logistics joint decision support tools (JDSTs) to the Global Combat Support System (GCSS). The principal goal is to revolutionize the logistics planning and execution process by providing specific domain capabilities through rapid application of emerging information technologies. JDSTs provide warfighters and logisticians the ability to assess support force capabilities to perform mission tasks, develop and evaluate logistics operational supports plans, and monitor logistics operations and react to deviations from projected support. This ACTD delivers tools that are available to all users via a Web-based client-server environment that complies with DII COE architecture standards and requirements.

Joint Medical Operations—Telemedicine (JMO–T) **(User Sponsor: U.S. Pacific Command), DTO F.27**

Purpose: To demonstrate the ability to integrate the services' deployable theater medical telepresence for improved force health protection, reduced force attrition, and minimized medical evacuations. Since future health support will often take place in austere environments, U.S. forces in a joint medical battlespace require an integrated, interoperable information network to move digitized medical information instead of patients or medical staff. Communicating medical threats and care between theater telemedicine teams and back to centralized medical facilities will provide improved diagnosis and treatment to forward areas. JMO–T modeling and simulation tools will improve medical mission planning for deployment. At its completion, JMO–T will provide a theater interoperable telemedicine force package that is manned, equipped, and trained, together with medical equipment and communications hardware, Theater Medical Information Program (TMIP) information management software, communications software, communications networks, and planning and rehearsal tools.

Joint Modular Lighter System (JMLS) **(Users Sponsor: U.S. Joint Forces Command), DTO F.20**

Purpose: To demonstrate sea-state-3–capable lighterage for Joint Logistics Over the Shore (JLOTS) operations. JMLS will demonstrate a service-interoperable prototype causeway lighter system that can be safely assembled and operated (in a loaded condition) through sea state 3. This capability will permit the rapid planning, deployment, and execution of more responsive and efficient logistics support to JLOTS operations. JMLS will permit the Army and Navy to acquire a single lighter system, thus producing savings from economies-of-scale production and reducing total life-cycle costs.

Joint Theater Logistics (JTL) **(User Sponsors: U.S. Joint Forces Command, U.S. Pacific Command), DTO F.28**

Purpose: To produce and transition advanced logistic and operational planning and execution capabilities to the warfighter using Web-based planning tools. JTL will demonstrate a collaborative environment between the operations and logistics staffs, with emphasis on deployed forces under the JTF command. JTL has three operational objectives. The first is to provide an integrated operations and logistics collaborative environment. By fusing operations and logistics information for the first time, operations and logisticians will share common data and views of operational plans and mission guidance. The second objective is to dynamically produce and assess logistics plans to support operational missions. This provides tailored logistics packages and sustainment directly to each level of the military operation. The third objective it to track the logistics situation, assess the impact of current logistics support on operations, and shift forces, equipment, and supplies enroute to meet changing requirements—all in real time.

Line-of-Sight Antitank System (LOSAT) **(User Sponsor: U.S. Central Command), DTO M.04**

Purpose: To meet the requirements of the lighter but more lethal Army, LOSAT will provide an antitank system that has the overwhelming lethality of the kinetic energy missile. LOSAT will be integrated into an expanded-capacity High-Mobility Multipurpose Wheeled Vehicle (HMMWV) to meet C–130 airdrop requirements and UH–60L (Blackhawk) helicopter slingload weight constraints. The objectives of the ACTD are to demonstrate system lethality and deployability/mobility, assess military utility through Battle Lab Warfighting Experiments, and provide residual hardware to an operational unit within XVIII ABN Corps.

Link–16 **(User Sponsor: U.S. Joint Forces Command), DTO C.07**

Purpose: To demonstrate an integrated capability to pass tactical information seamlessly among DoD tactical datalink systems. This ACTD focuses on two tactical datalink systems: Link–16 (used primarily by Navy and Air Force airborne, ground, and maritime assets) and the variable message format (VMF) (used primarily by U.S. Army and Marine Corps ground assets). The software program has been tested successfully in several operational demonstrations, including the Combat Identification Testing conducted in July 1998 and the All-Service Combat Identification Evaluation Team (ASCIET) 99 conducted in March 1999. At the request of NATO–SHAPE in June 1999, Link–16 was deployed in Kosovo to support Operation Allied Force, and the system still resides there in the Combined Air Operations Center (CAOC) to support efforts in theater. Based on deployment results, ongong improvements include the translation of additional DoD tactical datalink systems currently deployed in the Ballkan theater.

Migration Defense Intelligence Threat Data System (MDITDS) **(User Sponsor: U.S. European Command), DTO L.13**

Purpose: To supply the information infrastructure required for intelligence support in combating terrorism (CT) and force protection (FP) operations. The ACTD is enhancing MDITDS (the baseline DODISS migration system) software with advanced applications to maintain on line a centralized database of all antiterrorism security assessments and inspections of DoD facilities, as well as provide analysis on combating the terrorist threat to DoD interests worldwide. MDITDS is also providing the data repository and the functionality to access, evaluate, and disseminate this information. Capabilities include increased protection of DoD personnel, resources, and facilities; increased deterrence of terrorist attacks; and improved retaliation capability. MDITDS is being evaluated in a series of joint exercises by the U.S. European Command (the operational sponsor) and exercises in CONUS involving regular U.S. military forces, special operations forces, uniformed and civilian intelligence personnel, and DoD civilian personnel.

Military Operations in Urbanized Terrain (MOUT) **(User Sponsors: U.S. Special Operations Command), DTO E.02**

Purpose: To respond to the extremely difficult urban warfare environment, which requires manpower-intensive operations due to line-of-sight restrictions, inherent fortifications, limited intelligence, densely compacted areas, the presence of noncombatants, and associated restrictive rules of engagement. MOUT has evaluated 509 potential technological solutions and field-tested 128 of the most promising. Thirty-two products and technologies have been determined to have merit and will be evaluated further during remaining demonstrations. MOUT has instrumented sites at Fort Benning and Camp Lejeune and conducted two company-sized joint experiments with integrated Marine and Army forces. The culminating demonstration will integrate a Marine infantry company into an Army battalion, fully equipped with the MOUT ACTD package. This demonstration will take place at Fort Polk as part of a normal Joint Readiness Training Center rotation, which will occur as part of the Joint Contingency Force Experiment.

Miniature Air-Launched Decoy (MALD) Program **(User Sponsor: USAF Air Combat Command), DTO H.04**

Purpose: To develop and demonstrate a small, low-cost, expendable air-launched decoy designed to enhance the survivability of friendly aircraft and aid in establishing air superiority by diluting and confusing surface-based and airborne enemy air defense systems. MALD can be carried by and launched from fighter aircraft and, once launched, requires no guidance from other aircraft or ground stations. The vehicle, which is approximately 8 feet long and weights 100 pounds, is powered by an extremely small turbojet engine that develops 50 pounds of thrust. The electronics package is made up of the Signature Augmentation System (SAS), which electronically enlarges the decoy's radar cross section to make it look like jet aircraft. MALD is currently undergoing the military utility assessment conducted by the Air Combat Command. The Air Force is considering production in future years.

Personnel Recovery Mission Software (PRMS) **(User Sponsor: U.S. Pacific Command), DTO A.30**

Purpose: To improve the command and control functions associated with personnel recovery (PR) operations. PRMS will increase the probability of safe recoveries, increase the speed of the recovery process, and lower the cost of recovery. This will be accomplished by moving to an integrated GCCS software suite with currently available mission interface. PRMS will automate the critical early actions of a personnel recovery event. This will allow a more timely and focused response by recovery forces. The first PRMS operational demonstration is planned for the spring of 2000 in conjunction with Exercise Northern Edge in Alaska.

***Precision Targeting Identification (PTI)* (User Sponsor: Joint Interagency Task Force East), DTO C.05**

Purpose: To demonstrate the military utility of advanced active and passive sensor systems for precision detection and identification of targets from an airborne platform. PTI is employing an advanced electronic support measures (ESM) system and third-generation infrared, spectral, and laser radar (LADAR) systems together with an integrated command, control, and communications track dissemination system. The PTI system will provide a day/night target detection, classification, and dissemination capability at standoff ranges that cannot be achieved with conventional detection and monitoring systems. The system is being demonstrated in conjunction with Joint Interagency Task Force East counterdrug operations. It will provide sensor technologies that are applicable to DoD, U.S. Customs, U.S. Coast Guard, and personnel recovery agencies.

***Rapid Terrain Visualization (RTV)* (User Sponsor: U.S. Joint Forces Command), DTO A.06**

Purpose: To demonstrate the ability to rapidly provide digital topographic data (DTD) for the warfighter. Since DTD exists for only a very small portion of the Earth, future conflicts will likely involve U.S. forces in regions lacking topographic data. Indigenous forces will have the most comprehensive and accurate knowledge of the terrain. The RTV aircraft uses laser and interferometric SAR to develop terrain data for a 90- by 90-kilometer area in less than 72 hours. The RTV workstation software is capable of using data gathered by the radar-equipped RTV aircraft, or data provided by NIMA or commercial sources to develop custom terrain products. The products support intelligence preparation of the battlefield (IPB) and mission planning and rehearsal. Software modules will transition to the Digital Topographic Support System. RTV will support the Army's Joint Contingency Force Experiment in September 2000 with high-resolution topographic data of Fort Polk's urban operations site.

***Small-Unit Logistics (SUL)* (User Sponsor: U.S. Pacific Command), DTO F.29**

Purpose: To develop a tactical-level logistics command and coordination system to fuse information from DoD and service legacy logistics systems. The goal is to provide timely situational awareness, a common tactical-level logistics picture, and access to logistics planning, decision support, and course of action (COA) analysis tools. SUL will provide tactical (small-unit) logisticians and commanders an interoperable combat service support command coordination system that enables them to support and sustain operating forces quicker and more effectively with a reduced forward-based logistical footprint.

***Space-Based Space Surveillance Operations (SBSSO)* (User Sponsor: U.S. Space Command), DTO A.28**

Purpose: To demonstrate that a space-based sensor can be integrated into the space surveillance system and greatly enhance the performance of that system. The SBSSO uses the space-based visible (SBV) sensor on the Ballistic Missile Defense Organization (BMDO) Midcourse Space Experiment (MSX) program spacecraft. The program has found over 80 lost satellites to date and has improved the performance of the space surveillance system by over 20 percent for geostationary satellites. The system operation is being extended into low-altitude surveillance domains in FY2000.

***Theater Air and Missile Defense Interoperability (TAMDI)* (User Sponsor: U.S. Joint Forces Command), DTO M.10**

Purpose: To integrate separate Navy and Army air defense systems and allow them to exchange target track information to achieve an integrated air defense picture. The track data accuracy will be sufficient to engage an airborne target with a Patriot surface-to-air missile using only the Navy's radar sensor data. Target tracks will be passed between the Navy and Army air defense units using the U.S. Navy Cooperative Engagement Capability (CEC) as the data transfer mechanism. Objectives of the project include bounding the target track errors using two totally separate track and geoposition (gridlock) schemes. Data will be collected during this project to provide the Theater High-Altitude Air Defense (THAAD) program information regarding air picture integration and interoperability needs.

***Theater Precision Strike Operations (TPSO)* (User Sponsor: U.S. Forces Korea), DTO B.25**

Purpose: To provide ground component commanders with the automation needed to plan and direct counterfire and precision strike operations. This capability will interface with Air Force and Navy command and control systems to achieve synchronization of U.S. and coalition assets and activities for strike planning at the theater level. TPSO will be demonstrated in Korea during FYs 2000 and 2001.

COMPLETED ACTDS (DEMONSTRATED PHASE COMPLETE)
Advanced Joint Planning **(User Sponsor: U.S. Atlantic Command)** *Purpose:* To enhance joint operational planning capabilities by leveraging, refining, and integrating emerging technologies. This ACTD, including the Joint Readiness Extension, was completed in the first quarter of FY98, after developing and demonstrating a capability to integrate, organize, analyze, and present joint readiness data for all CONUS-based forces. The Joint Planning and Execution Tool (JPET) kit and the Joint Readiness Automated Management System (JRAMS) provide a comprehensive set of distributed planning tools for use in mission planning, COA development and evaluation, and logistics and transportation assessment. The Map-Based Planner software application was deemed in need of additional development before it could provide adequate military utility. Some of the software tools from this ACTD have been operational at USACOM for almost 2 years and have reduced planning times between the CINC and his components from approximately 7 days to several hours. The JPET, JRAMS, and Automated Joint Monthly Readiness Review (AJMRR) tools have been incorporated into the Global Command and Control System and the Readiness Assessment System (RAS).
Airbase/Port Biological Detection **(User Sponsors: U.S. Central Command, U.S. Pacific Command (U.S. Forces Korea))** *Purpose:* To demonstrate an interim capability to automatically detect and identify in near-real time a biological attack on an airbase or port facility. This capability can potentially prevent mass casualties and maintain operational effectiveness at the facility. A modified Interim Biological Agent Detector (IBAD)—which includes an integrated, automated agent identification capability—has been developed and has successfully met ACTD objectives for timeliness and sensitivity during testing at Dugway Proving Ground, Utah, against four biological agent simulants. This device represents a significant enhancement in capability, detection sensitivity, and time from detection to warning. Deployment of the ACTD sensor network began in late 1998 in the Republic of South Korea. A typical network will consist of 24 sensors configured to provide coverage of the entire base. The prototype system is operational in Southwest Asia.
Chemical Add-On to Airbase/Port Biological Detection **(U.S. European Command)** *Purpose:* To integrate a networked chemical warning capability using mature and available technologies to automatically detect and identify, in near-real time, chemical threats within the designated areas of operations associated with the Airbase/Port Biological Detection ACTD; to accelerate the demonstration of a Joint Warning and Reporting Network (JWARN); and to provide an interim capability to support the CINCs for 2 years after the demonstration. The process of integrating the chemical and biological detection systems began in FY97. Full operational testing with simulated chemical and biological attacks was conducted in FY98 at Dugway Proving Ground.
Combat Identification (CID) **(User Sponsor: U.S. Atlantic Command)** *Purpose:* To demonstrate system alternatives that can enhance the capability of U.S. combat forces to positively identify friendly and hostile platforms during air-to-ground and ground-to-ground operations in order to preclude fratricide due to misidentification and to maximize combat effectiveness. The Battlefield Combat Identification System (BCIS) was installed on the vehicles of the 4th Infantry Division to provide training during the Task Force XXI exercise. The CID ACTD provided a mechanism to improve the most deficient combat identification mission areas: air-to-surface and surface-to-surface combat identification of hostile forces. CID's dual approach of improving situational awareness and positive, immediate target identification provided synergistic solutions for increasing combat effectiveness while minimizing fractricide on future battlefields. Concurrently, the CID ACTD enabled refinement of joint/service CID tactics, techniques, and procedures. Success of the Army's BCIS resulted in an FY99 limited-rate initial production (LRIP) contract award for 2,620 units to be procured in the FY99–05 timeframe, with fielding beginning in FY01. The Situational Awareness Data Link (SADL) is being fielded by the Air National Guard for close air support missions.
Combat Vehicle Survivability **(User Sponsor: III Corps)** *Purpose:* To demonstrate low-cost Advanced Survivability Technology (AST) on an Abrams tank that will significantly increase the survivability of combat vehicles on the battlefield. This ACTD demonstrated reduced vulnerability of a platoon-size element equipped with AST. Its residual equipment will be used by the 4th Infantry Division, and its exhaust treatment technology will be integrated into the Abrams System Enhancement Program.

Consequence Management **(User Sponsor: U.S. Marine Corps)**

Purpose: To demonstrate the capability to detect and model, inside a building, a biological warfare (BW) agent simulant for consequence management. This ACTD fully satisfied its objective of demonstrating the U.S. military's capability to perform in a supporting role for consequence management of the terrorist/paramilitary use of biological weapons or agents. The ACTD ran for less than 12 months with two major demonstrations conducted in 7 months. Exemplar results of the final demonstration in December 1997 and subsequent activities follow. Fifteen biological agent collection, detection, and identification technologies were evaluated with a subset meeting near-term assay timeline goals. These sensors allowed units to perform onsite analysis and identification of suspected BW agents in less than 1 hour, unlike other methods that require specialized laboratories. Integrated, dedicated chamber tests and a vignette day were used to establish definitive baseline technical performance levels for the technologies while also providing realistic training for the U.S. Army Technical Escort Unit (TEU) and the U.S. Marine Corps Chemical/Biological Incident Response Force (CBIRF). The sensors are one of several residual technologies that were favorably assessed and are being procured by the participating units. Another residual is coming from the evaluation of several modeling tools that simulate the complex air flow in multistory buildings. These indoor hazard prediction models assist first responders in determining source and high-contamination areas. Open-air hazard prediction models were also evaluated. The combination of these two modeling residuals allows users to train for a much wider range of scenarios and environments than they could before the ACTD. Soldiers from the TEU and Marines from the CBIRF worked together for the first time and produced a jointly approved concept of operations—a significant residual. The ACTD was also the venue for the units to develop rigorous chain-of-custody procedures. The CONOPS is now used whenever the units operate together, and the chain-of-custody procedures have become standard operating procedures. For the first time, non-DoD federal agencies, state emergency management personnel, and local first-responders participated in a DoD ACTD from initiation to conclusion and obtained significant training on DoD unit capabilities. This has facilitated better coordination between the services and federal, state, and local agencies in exercises to prepare for actual events. The ACTD's success in demonstrating emerging technologies in an operational setting and in providing diverse and novel residuals represents a concrete example of DoD's efforts to address the equipment, doctrinal, and interagency coordination challenges posed by the terrorist use of BW. Equipment residuals have been deployed during a variety of current events, such as the U.S. visit of Pope John Paul II in 1999.

Counterproliferation I **(User Sponsor: U.S. European Command with participation from U.S. Atlantic Command, U.S. Strategic Command, U.S. Pacific Command, and U.S. Special Operations Command)**

Purpose: To develop, integrate, demonstrate, and deliver to warfighters a militarily ready capability to characterize, destroy, and disrupt fixed nuclear, biological, and chemical (NBC) facilities and minimize collateral effects. The program delivered an end-to-end system of sensors, target planning systems, and advanced weapons to improve warfighting capabilities against NBC targets. USEUCOM is the operational sponsor. Phase I consisted of a series of attacks on earth-mounded concrete masonry simulated biological storage facilities. Phase I was completed in February 1997 with the successful demonstration of a target attack planning and collateral effects prediction system, and the Hard Target Smart Fuze (HTSF). An interim demonstration series called Dipole Tiger (DT) was conducted in response to the sponsor's need to understand the baseline capability of current weapons to attack an above-ground, soft, chemical production facility while minimizing collateral effects. The DT tests highlighted the need to keep weapon fragmentation patterns away from agent storage vessels. Phase II will consist of a series of attacks on a hardened, reinforced concrete facility with a burster slab protecting a simulated chemical weapon production capability. Sensors, target planning tools, and advanced weapon systems were demonstrated during the final demonstration testing, conducted from January through July 1998. ACTD elements were deployed to Kosovo. Current USAF, USN, and USSOCOM procurement plans include fuzes, sensors, and penetrators.

Counter-Sniper **(User Sponsor: Dismounted Battlespace Battle Laboratory)**

Purpose: To rapidly provide counter-sniper sensor systems for evaluation by Army, Marine, and Special Forces users; provide training for users who will be prepared to quickly deploy sniper detection technology; and provide feedback to system developers. This ACTD enabled various DoD users to evaluate a variety of state-of-the-art sniper detection capabilities. Over a short term (4-month) period ending in November 1996, the Army, Navy, and Marine Corps cooperated in evaluations of four developing counter-sniper system concepts. Evaluations were performed over a range of circumstances, with the primary goal to determine the soundness of the technical approach and the utility of each system. Three of the systems were judged to have military utility, and 10 prototype systems are available for rapid deployment. One of the systems was deployed in the Olympic Village at Ft. Benning for the duration of the 1996 Olympic Games in Atlanta. The ACTD achieved the goal of quickly providing an interim counter-sniper capability consisting of sensor systems, tactical procedures, and trained users. In addition to the fieldable prototypes introduced during the ACTD, and based on ACTD results, the Army and DARPA are examining more mobile vehicle-mounted and helmet-mounted counter-sniper detection systems for further development.

Cruise Missile Defense—Phase I **(User Sponsor: U.S. Pacific Command)**

Purpose: To detect, track, and successfully engage cruise missiles at ranges beyond the radar horizon of ship- and land-based air defense units, and to assess joint doctrine and concepts of air defense operations. This ACTD demonstrated the first-ever beyond-radar-horizon engagements of cruise missile targets. The Phase I demonstration was completed in January 1996 with four live intercepts of targets simulating land attack cruise missiles by ship-launched air defense missiles directed by a surrogate airborne radar located on the top of a nearby mountain. This concept of an elevated sensor has been a central element of cruise missile defense architectures since that time, and is continuing development by the Ballistic Missile Defense Organization and Joint Theater Air Missile Defense Organization.

High-Power Microwave (HPM) **(User Sponsor: EUCOM)**

Purpose: To demonstrate the military utility of a high-power microwave system for tactical purposes. HPM demonstrated the capability to neutralize specific targets in a real-world environment. In addition, it validated logistics, training, and maintenance assumptions applied to the operational use of this specific system.

Joint Countermine (JCM) **(User Sponsor: U.S. Atlantic Command)**

Purpose: To demonstrate the capability to conduct effective, seamless amphibious mine countermeasure operations from sea to land; to provide simulation tools for JCM operations; and to define a JCM command, control, communications, and intelligence (C^3I) architecture. The initial demonstration occurred in the summer of 1997 under U.S. Atlantic Command sponsorship. JCM integrated 13 novel systems for both detecting and clearing mines and minefields. These systems were integrated with operational countermine systems under an umbrella including a JCM C^4ISR architecture, JCM common operational picture software, and a JCM operational simulation system. Two major demonstrations were conducted in conjunction with JTF exercises in FY97 and FY98. Four of the original systems have completed transition to acquisition phases. The Near-Term Mine Reconnaissance System (NMRS) and Airborne Standoff Mine Detection System (ASTAMIDS) have entered LRIP. The Coastal Battlefield Reconnaissance and Analysis (COBRA) system and the Explosive Neutralization (EN–ATD) technology have entered the engineering and manufacturing development (EMD) phase.

KE Boost-Phase Intercept (Phase I) **(User Sponsors: Air Combat Command; Naval Air Warfare Center (N–88), Deputy Chief of Naval Operations for Resources & Warfare Requirements)**

Purpose: To assess the operational utility, mission effectiveness, and affordability of air-launched kinetic energy (KE), boost-phase intercept (BPI) systems. The KE BPI ACTD proposal was partitioned into two ACTDs at the recommendation of the Vice Chairman of the Joint Chiefs of Staff. The objective was to intercept ballistic missiles before they could deploy submunitions or other countermeasures. The 12-month, $40 million KE BPI Phase I ACTD was structured as a joint Air Force/Navy effort to develop the concept of operations, establish a force-level simulation of system performance, conduct pilot-in-the-loop simulations to measure pilot responses to threat detection, and assess performance as a function of the number of aircraft equipped with BPI capability. The assessment indicated that the BPI system would be feasible and would not place excessive demands on the pilot. However, the number of aircraft required to provide an effective defense capability was excessive. A decision was made not to proceed with the Phase II ACTD, a $400 million prototype system demonstration.

Low-Life-Cycle Cost, Medium-Lift Helicopter **(User Sponsors: U.S. Navy, Military Sealift Command)**

Purpose: To evaluate the military utility of employing a commercial off-the-shelf helicopter to perform the Military Sealift Command fleet vertical lift support mission. This ACTD, originally planned for FY96, was executed during August–October 1995 with a very successful demonstration of leased commercial helicopters and crews on Military Sealift Command ships. As a result of the demonstration, the Navy has concluded that leasing helicopters may be a viable alternative for vertical replenishment. The Navy completed a 6-month follow-on demonstration in the Indian and Atlantic oceans and is considering privatization options for the rest of the Military Sealift Command fleet.

Medium-Altitude Endurance Unmanned Aerial Vehicle (MAE UAV) (Predator) **(User sponsor: U.S. Atlantic Command)**

Purpose: To provide a rapidly deployable, medium-altitude reconnaissance and surveillance capability. Predator progressed from a concept to a three-system operational capability in less than 30 months. The Predator ACTD was initiated in 1993, and the first flight occurred in 1994. Predator first deployed to Gjader Field, Albania, from June to October 1995 in support of Operation Provide Promise, flying 77 operational missions and logging 753 hours. From March 1996 through September 1998, it has flown 625 operational flights totaling 4,644 hours in support of Implementation Force (IFOR)/Security Force (SFOR) tasking in the Bosnian theater. Overall, Predator has logged (through September 1998) 2,210 flights totaling 9,834 hours. Predator was also deployed to Southwest Asian operations in February 1999. Operational lead and program acquisition have undergone transition to the Air Force. Twelve systems, each containing four air vehicles, are being procured.

Navigation Warfare (Navwar) **(User Sponsor: U.S. Joint Forces Command)**

Purpose: To develop and demonstrate Navwar prevention (jamming) and protection (antijam) technologies by providing enhanced GPS receivers (handheld and avionics) for use in a challenged electronic warfare (EW) environment as well as devices that provide an initial satellite navigation (SATNAV) prevention capability. The Navwar ACTD successfully developed and demonstrated three SATNAV prevention capabilities and an enhanced handheld GPS receiver during the conduct of eight demonstrations. In addition, a Navwar CONOPS was developed, and a number of GPS vulnerabilities were observed and identified to the warfighter. The Navwar ACTD was completed on 30 September 1999. All legacy prevention assets will be transferred to the 746th Test Squadron, where they will be made available to the warfighter for operations and exercises by the Joint Forces Command (JFCOM). The continued development and demonstration of the avionics protection receivers will be sponsored by JFCOM and conducted by the Joint GPS Combat Effectiveness (JGPSCE) joint test and evaluation (JT&E) office.

Precision/Rapid Counter-Multiple Rocket Launcher (P/RCMRL) **(User Sponsor: U.S. Forces Korea)**

Purpose: To develop and demonstrate an adverse-weather, day/night, end-to-end, sensor-to-shooter, precision deep-strike capability against North Korean long-range artillery. The P/RCMRL ACTD addressed the North Korean multiple rocket launcher threat along the DMZ in Korea. In 24 months, this ACTD demonstrated and fielded significant improvements in capability related to rocket launch detection, command and control, and counterfire necessary to effectively neutralize the threat. By reducing sensor-to-shooter timelines by a factor of three, increasing counterfire accuracy, and providing orchestration of air and naval forces, P/RCMRL significantly reduces the threat to Seoul and to deployed U.S. and coalition forces. The ACTD contributed to an overall understanding of short sensor-to-shooter timeline CONOPS in all Army areas of responsibility. The systems developed and deployed in P/RCMRL are standing watch with the 2nd Infantry Division in Korea. The technology is being transitioned into Army baseline systems.

Precision Signals Intelligence Targeting System (PSTS) **(User Sponsor: U.S. Forces Korea)**

Purpose: To develop and demonstrate a near-real-time, precision targeting, sensor-to-shooter capability using existing national and tactical signals intelligence (SIGINT) assets. PSTS developed advanced cooperative precision targeting algorithms, processing enhancements, site interfaces necessary for cooperative operation, and a CONOPS for asset cooperative utilization and minimal operational impact. This ACTD was executed as a series of demonstrations that incrementally improve the overall capability in terms of the complexity of emitters that can be targeted, the degree of engineer versus operator involvement, and the tactical utility. A demonstration in Korea was completed in September 1998. The SIGINT data were collected by assets in Korea and by national means, processed in CONUS, and transmitted to warfighters in Korea over existing SIGINT dissemination communication links. PSTS systems have begun limited operational use with U.S. Forces in Korea.

Rapid Force Projection Initiative **(RFPI) (User Sponsor: XVIII Airborne Corps)**

Purpose: To demonstrate sensor-to-standoff killer capability for light early-entry forces. The RFPI ACTD demonstrated a hunter/standoff killer (HSOK) concept for extending the early-entry brigade deep and close fights. The HSOK concept uses long-range precision sensors, weapon systems, munitions, and digital C^2 systems to defeat an enemy armored force and its associated indirect-fire systems before it can decisively engage friendly forces. With the HSOK concept, the fight is essentially completed, with the fewest possible friendly losses, beyond enemy direct-fire weapon ranges. A series of partial demonstrations led up to a full-scale, free-play demonstration in the fourth quarter of FY98. This final demonstration occurred at Fort Benning, Georgia, and included both live and virtual forces. The ACTD was completed in FY98. Two of its systems, the High-Mobility Artillery Rocket System (HIMARS) and the 155-mm Automated Howitzer with Digital Fire Control System, have entered the EMD phase. The Hunter Sensor Suite has been operationally fielded.

Semiautomated Imagery Processing **(User Sponsor: U.S. Joint Forces Command)**

Purpose: To significantly improve an imagery analyst's ability to provide accurate, timely situation awareness to the warfighter. This system will allow analysts to exploit the output of an increasing quantity of imagery collection assets. Field tests commenced in March 1997 with the XVII Airborne Corps using the Enhanced Tactical Radar Correlator (ETRAC) ground station as a radar interface. There were also several subsequent, successful XVIII Airborne Corps evaluations during field exercises. System residuals were provided to the Army and Air Force in FY99.

Synthetic Theater of War (STOW) **(User Sponsor: U.S. Atlantic Command)**

Purpose: To provide an operational demonstration of advanced distributed simulation technologies that will directly support joint training and mission rehearsal. STOW demonstrated and evaluated the capabilities of advanced distributed simulation technology to improve joint training and mission rehearsal. Specific objectives achieved in Unified Endeavor 98–1, a Joint Task Force-level exercise conducted in October 1997, included a demonstration of enhanced simulation fidelity based on combat resolution at the weapon system level; realistic simulation of command and control behavior; networking and information flow technology; and the capability to provide knowledge-based autonomous forces in simulation with man-in-the-loop participation wherever desired. The system supported up to 8,000 entities, demonstrating a new milestone in simulation scalability. The combination of STOW's successes with C^4I, knowledge-based force integration, and the common data infrastructure demonstrates a significant potential for using simulation with lower cost and greater efficiency in the training, mission rehearsal, and analysis required by *Joint Vision 2010*. STOW is providing many of the baseline capabilities for DoD's next-generation Joint Simulation System (JSIMS), and STOW technologies, tools, and applications are being transitioned to JSIMS, JWARS, and the services (e.g., Army STOW–A, Navy Battle Force Tactical Training (BFTT), Air Force Distributed Mission Training, USMC at the schoolhouse at Quantico). The STOW technologies and prototype are supporting USACOM exercises and events, and the possibility of using STOW as the simulation engine with which to bring other ACTDs to USACOM through simulation to help in assessment of military utility is being explored. USACOM is employing STOW in its first joint experiment. Work on simulation-based acquisition has been initiated via an agreement with the Joint Strike Fighter (JSF) program on how STOW can help the JTF with its life-cycle simulation requirements. STOW continues to import technology developed by the U.K. in the areas of chemical/biological and command agents, which continues STOW's successes in the international arena. Finally, the project is transitioning technology to industry. It is already appearing in industry proposals, which is a good indication that the commercial sector respects and believes in the technology.

Tactical Unmanned Aerial Vehicle (TUAV) **(User Sponsors: U.S. Army Training and Doctrine Command, U.S. Marine Corps Deputy Chief of Staff (Aviation), and Commander, Naval Air Forces, Atlantic Fleet)**

Purpose: To demonstrate a low-cost TUAV system for use by brigade-level commanders. This ACTD has completed its final demonstration phase and has been chosen by the Army to participate in a four-system competition leading to full acquisition.

Unattended Ground Sensors **(User Sponsors: U.S. Central Command, U.S. Special Operations Command)**

Purpose: To evaluate the military utility of two distinct unattended ground sensors: the Unattended MASINT Sensor (UMS) (the air-dropped Steel Eagle and the hand-emplaced Steel Rattler) and the Remote Miniature Weather Station (RMWS). For 24 months, the UGS ACTD demonstrated and fielded improvements in the capability of the UMS to detect, locate, identify, and report time-critical targets, primarily theater ballistic missiles. Exercised in conjunction with Special Forces (SF) detachments, the UMS proved itself to be a force multiplier and allowed SF to make operational decisions, for the first time, based on the UMS reports. In addition, RMWS, through close coordination with multiple users and during multiple demonstrations over 24 months, proved its utility when requested by the U.S. European Command in support of Operation NOBLE ANVIL in Kosovo. The RMWS proved itself through reports to operational forces that helped them to determine the safest routes of travel and transit. The RMWS is in the process of becoming a standard Air Force program through Air Force OS21. The UMS is currently in transition to acquisition with the U.S. Air Force.

C. JOINT EXPERIMENTATION AT U.S. JOINT FORCES COMMAND

JE supports, integrates, and leverages other CINC, Services, and Agencies experimental programs to synchronize efforts and provide a joint context for experimentation.

—H. W. Gehman, Jr., Admiral, U.S. Navy
Commander in Chief, U.S. Joint Forces Command

***Introduction*:** Joint experimentation (JE) is an iterative process for developing and assessing concept-based hypotheses to identify and recommend the best value-added solutions for changes to doctrine, organizational structure, training and education, materiel, leadership, and people (DOTMLP) required to achieve significant advances in future joint operational capabilities. On May 15, 1998, the Secretary of Defense chartered the now Commander in Chief, U.S. Joint Forces Command (USCINCJFCOM), to serve as the DoD Executive Agent for Joint Experimentation, effective October 1, 1998. Secretary Cohen committed DoD to an aggressive program of experimentation to foster innovation and support the rapid fielding of new concepts and capabilities. His charter established JE as one of the primary methods for exploring, testing, validating, or modifying future operational concepts to drive changes in DOTMLP for the future joint force.

USJFCOM will use the Joint Warfighting Science and Technology Plan as a primary source for identifying technological capabilities to be incorporated into joint concept development and experimentation activities, and will report to the CJCS and the Director of Defense Research and Engineering on desired technology objectives that emerge as a result of joint experimentation efforts, including technology shortfalls and opportunities for leap-ahead technologies.

—Defense Planning Guidance

The JE program has two fundamental purposes. The first is to sustain and widen the qualitative superiority of our joint forces over all potential 21st century rivals. The second is to prevent any adversary from surprising us by exploiting advanced technologies faster than we can. Through concept exploration, the JE program will conduct objective, empirical evaluations not only to discover new technologies, but also to determine the best tactics, techniques, and procedures to fulfill these purposes. In addition, an important early objective of the JE program is to develop an extensive community of organizations involved in military transformation, including combatant commands, the services, DoD and other agencies, military and civilian academia, and industry. In FY 00, USJFCOM will also explore ways to expand agency involvement and include international partners in the JE program.

As Executive Agent for Joint Experimentation, the USCINCJFCOM has the following mission:

- Work with the services, other defense agencies, CINCs, academia, and the private sector to identify and explore new concepts in joint warfighting.
- Coordinate, integrate, and leverage ongoing CINC, service, and agency experimentation programs.
- Conduct joint experiments and explore, demonstrate, and evaluate joint warfighting concepts, processes, and technologies to enhance U.S. force capabilities.

- Assess experimentation results and provide recommendations to improve joint operations in terms of DOTMLP.

Joint experimentation is focusing on the application of new technologies into the concepts outlined in the Joint Experimentation Campaign Plan 2000 (CPLAN 00) (Reference 8).

Implementation: USCINCJFCOM has designed CPLAN 00 to fulfill the Secretary of Defense's Joint Experimentation Charter. CPLAN 00 expands the U.S. Joint Forces Command (USJFCOM) JE program to develop and assess innovative concepts and leap-ahead technologies that can generate significant improvements to joint doctrine, organizations, training and education, materiel, leadership, and personnel (DOTMLP) programs. The JE program is a major component of the Chairman, Joint Chiefs of Staff, initiative to implement *Joint Vision 2010*, described in the *Joint Vision Implementation Master Plan* (JIMP) (Reference 9). The JE program is also designed to improve the operational capabilities of the future force to ensure our ability to sustain full-spectrum dominance well into the 21st century.

The construct of the USJFCOM CPLAN 00 provides for experimentation on three axes. The first axis explores how off-the-shelf technologies can be used to enhance current platforms and concepts of operation. This axis supports maintaining our current qualitative edge over existing threats. The second axis focuses on the implementation of *Joint Vision 2010*. It explores how emerging technologies and advanced information systems can be used to support the evolution of today's joint force. It develops concepts that primarily use today's platforms (or their derivatives) in new ways to create greater synergy and effectiveness, enabling full-spectrum dominance over emerging threats. The third axis explores the revolutionary concepts and technologies that will result in the transformation of the force, enabling continued success against the challenges presented by the Revolution in Military Affairs (RMA). Interoperability of systems and functions cuts across all three axes.

CPLAN 00 focuses on high-priority tasks assigned to USJFCOM in the Defense Planning Guidance and the Chairman of the Joint Chiefs of Staff's Instructions on Joint Experimentation. The USJFCOM effort in FY 00 will emphasize developing and experimenting with the Rapid Decisive Operations (RDO) "integrating" concept as a fundamentally new 21st century approach to joint combat operations. The FY 00 JE program will also focus on four functional concepts that will provide critical capabilities for RDO: attack operations against critical mobile targets, common relevant operational picture, adaptive joint command and control, and joint interactive planning. USJFCOM will continue CPLAN 99's conceptual work on *Focused Logistics: Enabling Early Decisive Operations* and begin early conceptual efforts in areas related to information operations, forcible entry, and strategic deployment. Oversight of each concept is through a core integrated concept team (ICT) composed of members from each division in the USJFCOM Joint Experimentation Directorate. An expanded ICT for each concept includes members from the Joint Staff, DoD agencies, services, and USJFCOM components. The summaries of the FY 00 JE program concepts are presented at the end of this chapter (Figures III–2 through III–10).

***Joint Experimentation Products*:** CPLAN 00 provides the JE work plan to achieve a variety of outcomes, as shown in Figure III–1. Among the principal experimentation events to be conducted in FY 00 are the following:

- A major simulations-supported experiment in coercive operations exploring the RDO concept. This experiment will also provide an operational environment to continue

and expand the work conducted on attack operations against critical mobile targets during the FY 99 Joint Experiment.

- Leveraging of service experiments to include the Army's Joint Contingency Force Advanced Warfighting Experiment, the Air Force's Joint Expeditionary Force Experiment, the Navy's Fleet Battle Experiment—Hotel, and the Marine Corps' Capable Warrior experiment.
- An Information Superiority workshop and wargame, to be conducted in FY00, to further investigate the Common Relevant Operational Picture.
- A comprehensive exploration of future technologies in support of the Joint Force After Next.
- A series of comprehensive baseline assessments and vulnerability assessments to support concept development.
- A limited-objective experiment on the application of non-kinetic engagement technologies.

CPLAN 00 explains the new "spiral development" strategy that will ensure both complete concept development and rapid identification and application of the most promising findings. This plan also outlines the level of experimentation operations that USJFCOM will conduct. Major annual elements planned for the end-state program include:

- Two major simulation-supported experiments
- Five major JV2010 and two major Joint Force After Next wargames
- Multiple leveraged and limited-objective experiments
- An extensive technology and vulnerability assessment program.

In addition, USJFCOM J9 will issue an annual data call message to all CINCs by December 1 of each year requesting CINC priority issues and initiatives for JE. CINC input will be received by January 1 and reviewed during annual CPLAN major planning conferences.

Beginning in FY 04, USJFCOM will also conduct Major Joint Integrating Experiments (MJIEs) involving significant live forces in the field. These major experiments will occur on a 12- to 24-month basis and will explore in a robust environment the integrating concepts developed to address the issues of the complex mission environments that the future presents.

The CPLAN also outlines the mechanism to be used to increase the range of operational missions and environments that the JE program will explore over time, to include the major theater war, stability and peace operations, and the military dimensions of homeland defense. The CPLAN provides detailed descriptions of the concepts under development and an initial strategy for experimentation events and contains a list of CINC- and service-sponsored events that may be candidates for leveraging and mutual support between USJFCOM and the event sponsors.

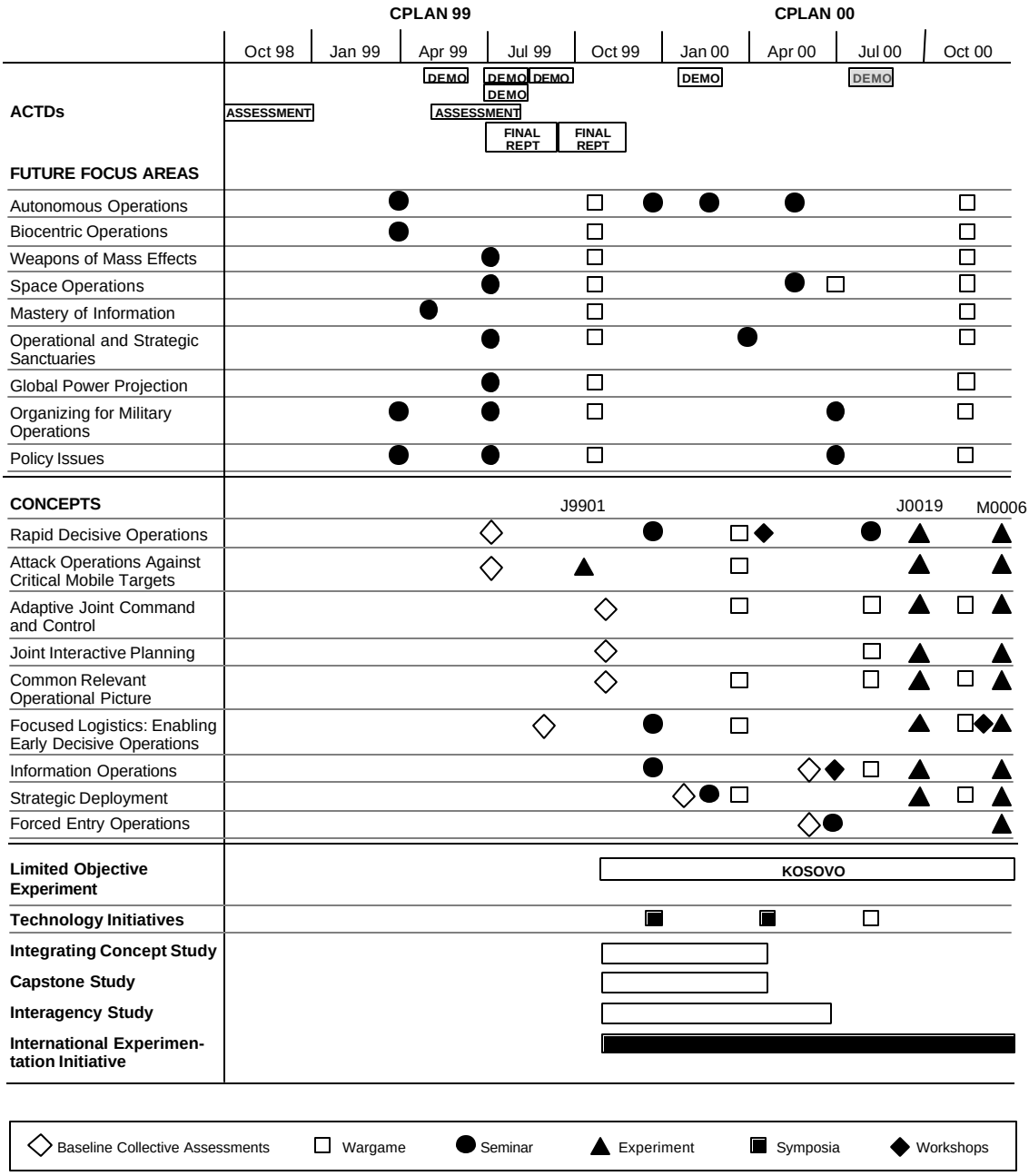


Figure III–1. Joint Experimentation Efforts for FY 99 and 00

Technology Role in Joint Experimentation: The USJFCOM campaign plan recognizes that technological superiority has been, and continues to be, a cornerstone of our national military strategy. CPLAN00 is structured to leverage the current and future technological investments of DoD and other agencies. Today's technological edge and technological investment are tomorrow's joint force technological innovations, allowing us to continue to prevail decisively across a broadening spectrum of conflict. The strengthened and responsive DoD S&T strategic planning process will be used by JE as a primary source for identifying emerging technological capabilities to be incorporated into joint concept development and experimentation activities. Critical to the planning process is the *Defense Science and Technology Strategy* (Reference 1) with its supporting *Basic Research Plan* (Reference 2), *Defense Technology Area Plan* (Reference 3), and this *Joint Warfighting Science and Technology Plan*. JE will look to these documents to leverage the collaborative efforts of the OSD, Joint Staff, CINCs, military services, and defense agencies. The USJFCOM JE Directorate, with the assistance of other USJFCOM directorates and special staff, intends to sustain a very aggressive exchange of information and interaction with the DoD S&T strategic planning process owners. JE has the potential to shape the efforts of the S&T community today and will provide for successful integration of innovative technologies into the battlefield of tomorrow. To this end, a JE Science and Technology Division has been established within the JE Directorate to act as the S&T embassy for JE.

ACTD Relationship to Joint Experimentation: ACTDs exploit mature and maturing technologies to solve important military problems. Joint experimentation is focused on enhancement (near term), evolution (mid term), and revolution (far term) of military capabilities. ACTDs fall mainly into the enhancements area, with some evolutionary and revolutionary impact. ACTDs can provide insights to future warfare and complement joint experimentation by providing valuable data and findings that relate to JE concepts. ACTDs can also bridge future concepts back to needed enhancements to current technology. Joint experiments can provide venues for ACTD assessment and demonstrations, and JE concept development can identify areas of interest for future ACTDs. The Table III–1 shows the relationship between ACTDs and current joint experimentation concepts.

Table III-1. ACTD/JE Concepts Relationships

Advanced Concept Technology Demonstrations	Joint Experimentation Concepts								
	Rapid Decisive Operations	Attack Operations Against Critical Mobile Targets	Common Relevant Operational Picture	Adaptive Joint Command & Control	Joint Interactive Planning	Focused Logistics Enabling Early Decisive Operations	Information Operations	Forcible Entry Operations	Strategic Deployment
Adaptive Course of Action	●		○	○	●	●		●	
Battlefield Awareness and Data Dissemination	●	●	●	●	●	●	●	●	●
Theater Precision Strike Operations	●	●	●		●			●	○
Battle Damage Assessment in the Joint Targeting Toolbox	●	●	○		●			●	
Joint Logistics	●		○	●	●	●		○	○
C4I for Coalition Warfare	●		●	●	●	○		○	
Migration Defense Intelligence Threat Data System	●		●		●	○			
Joint Theater Logistics	●		●	●	●	●	○	○	●
Information Operations Planning Tools	●	○	○		●	○	●		

Table III-1. ACTD/JE Concepts Relationships (continued)

Advanced Concept Technology Demonstrations	Joint Experimentation Concepts								
	Rapid Decisive Operations	Attack Operations Against Critical Mobile Targets	Common Relevant Operational Picture	Adaptive Joint Command & Control	Joint Interactive Planning	Focused Logistics Enabling Early Decisive Operations	Information Operations	Forcible Entry Operations	Strategic Deployment
Link–16/JVMF	●	○	○	○	●	○		●	
Navigation Warfare	●	●				○		●	
Tactical Unmanned Aerial Vehicle	●	●	○			○		●	
Precision Targeting Identification	●	●	●			○		○	
Chemical Add-On to Airbase/Port Biological Detection	○	●				○		●	○
Line-of-Sight Antitank System	○	●				○		○	
Unattended Ground Sensors	○	●	○			○			
Miniature Air-Launched Decoy Program	●		○			○		●	○
Military Operations in Urbanized Terrain	●							○	
Joint Advanced Health and Usage Monitoring System			○			●			
Information Assurance: Automated Intrusion Detection Environment				○			●		
Compact Environmental Anomaly Sensor II									
Force Medical Protection/Dosimeter			○					○	
Joint Countermine	○		●					●	
High-Power Microwave	○						○		
Joint Biological Remote Early Warning System	○		●	○				○	
Joint Modular Lighter System	○					●		○	●
Common Spectral MASINT Exploitation	○		○				●		
HUMINT Intelligence and Counterintelligence Support Tools	○							○	
Joint Medical Operations—Telemedicine	○		●						
Personnel Recovery Mission Software	○							○	
Small-Unit Logistics	○		●	○		●	○		●
High-Altitude Endurance Unmanned Aerial Vehicle	●	●						●	
Rapid Force Projection Initiative	●	○	○					●	
Airbase/Port Biological Detection	○	○						●	●
Combat Identification	○	○	●					○	
Precision Signals Intelligence Targeting System	●	●	●		○			●	
Integrated Collection Management	●	●	○	○	○			●	
Joint Continuous Strike Environment	●	●	○	○	○			○	
Theater Air and Missile Defense Interoperability	●	●	○		○			●	
Coherent Analytical Computing Environment					○	●		○	
Rapid Terrain Visualization	○		●		○			●	○
Extending the Littoral Battlespace	●	○	○	○	○			●	○
Space-Based Space Surveillance Operations	●	○			○			○	
Counterproliferation I	○	○	●		○			○	
Counterproliferation II	○	○	●		○			○	

● Strong Relationship ○ Moderate Relationship

JWCO Relationship to Joint Experimentation: The JWSTP takes a *joint* perspective horizontally across Applied Research (6.2) and Advanced Technology Development (6.3) plans of service and defense agencies to ensure that the requisite technology and advanced concepts for superior joint and coalition warfighting are supported. The core of the JWSTP is Joint Warfighting Capability Objectives (JWCOs). It is imperative that the JE concept developers be familiar with the activities supporting JWCOs. Table III–2 shows the relevance of the JWCOs to current approved JE concepts.

Table III-2. JWCO/JE Concepts Relationships

	Joint Experimentation Concepts								
Advanced Concept Technology Demonstrations	**Rapid Decisive Operations**	**Attack Operations Against Critical Mobile Targets**	**Common Relevant Operational Picture**	**Adaptive Joint Command & Control**	**Joint Interactive Planning**	**Focused Logistics Enabling Early Decisive Operations**	**Information Operations**	**Forcible Entry Operations**	**Strategic Deployment**
Information Superiority	●	●	●	●	●	●	●	●	●
Precision Fires	●	●	○	●	○	●	●	●	
Combat Identification	●	●	●					●	
Joint Theater Missile Defense	●	●	○	●	○		○	○	○
Military Operations on Urbanized Terrain (MOUT)	●	○	○		○	●	○	●	
Joint Readiness and Logistics, and Sustainment of Strategic Systems	●	○		○		●		○	●
Force Projection/Dominant Maneuver	●	●	○	●	○	●	○	●	●
Electronic Warfare	●	●			○		●	○	○
Chemical/Biological Warfare Defense and Protection, and Counter Weapons of Mass Destruction	●	●	○	●			○	○	○
Combating Terrorism	○	○	○	○		○	●		○
Protection of Space Assets	○	●					○		●
Hard and Deeply Buried Target Defeat	To be determined								

● Strong Relationship ○ Moderate Relationship

USJFCOM has established a technology assessment capability for the JE program in the form of an S&T Division within the USJFCOM Joint Experimentation Directorate. The S&T Division is the conduit into JE and the information source on JE activities for the S&T community. The FY 00 objectives for this capability include the following:

- Establishment of a collaborative relationship with other key members of the transformation community that are involved in developing and integrating new technologies into the future joint force. These include the defense and service science boards, DARPA, the JT&E program, ACTDs, JWCAs, industry, and academia. USCINCJFCOM will use the JWSTP and associated JWCOs and DTOs as primary sources for identifying technological capabilities to be incorporated into JE.
- Identification of the technologies that can potentially support JE concepts under development.

- An annual fall technology symposium for identification by industry of promising new technologies that can lead to development of additional high-value concepts for future joint operations.
- An annual spring briefing to industry at which the technology community (including industry, academia, and the R&D agencies) will be updated on concepts under development, additional joint issues, and results of experimentation. This forum will assist industry by focusing R&D efforts on the JE program's priority requirements.
- An annual technology wargame that assesses the applicability of industry proposals to joint concepts under development. This effort also leverages the services' technology wargame programs as a stating point, avoiding redundancies.

D. JOINT EXPERIMENTATION CONCEPT SUMMARIES

The concepts included in CPLAN 00 are those that are most essential to achieving the direction specified in the FY 2000 Defense Planning Guidance and the Chairman of the Joint Chiefs of Staff's instructions. In cooperation with the other CINCs, services, and defense agencies, USJFCOM developed warfighting concepts to reflect potential high-value solutions to joint capability issues that form the core of the JE program for FY00 and beyond. The primary strategic objective for the JE program in FY00 is to develop the integrated concept for rapid decisive operations. To accomplish RDO, the joint force must integrate eight new conceptual RDO components:

- Attack operations against critical mobile targets (AOACMT)
- Common relevant operational picture (CROP)
- Adaptive joint command and control (AJC^2)
- Joint interactive planning (JIP)
- Focused logistics enabling early decisive operations (FLEEDO)
- Information operations (IO)
- Forcible entry operations (FEO)
- Strategic deployment (SD).

These concepts, along with the overarching and integrating RDO concept, are the focus of the concept development and experimentation that USJFCOM will conduct beginning in FY00. Figures III–2 through III–10 provide brief summaries of the CPLAN 00 concepts. Figure III–2 summarizes the integrating RDO concept, and Figures III–3 through III–10 describe each of the supporting concepts. More detailed descriptions of each concept are found in USJFCOM's CPLAN 00 (Reference 8).

Joint Experimentation will be critical to the successful transformation of the U.S. military. It is a complex process that will require continuing bold vision, cooperation among all participants, and robust resourcing, if we are to meet the challenges before us.

> *Our goal is to produce revolutionary changes and transform the U.S. military… This can be achieved only if we rigorously test our technology, ideas, and plans through joint experimentation.*
>
> —Henry H. Shelton, General, U.S. Army

OVERVIEW

Simultaneity is a key operational characteristic of the American way of war. The dynamic combination of *JV 2010*'s dominant maneuver, precision engagement, focused logistics, and full-dimensional protection will enable the joint force commander to deploy, protect, and sustain the force and achieve decisive results more rapidly than ever before. Striking the adversary quickly, in all dimensions at once, will foreclose or narrow his most damaging options.

The RDO concept describes how the JFC can undertake operations immediately to strike at the heart of the enemy's vulnerabilities and most dangerous capabilities to achieve rapid strategic success. The concept seeks to rapidly deny, degrade, or destroy strategic and operational centers of gravity using methods and capabilities that provide viable military options without having to conduct an extensive buildup of forces and support in the theater of operations .

The Result: **More credible conventional deterrence and quicker conflict resolution.**

HIGHLIGHTS

21st Century Environment

Through 2010 and beyond, well-balanced military forces that can dominate opponents across the full range of military operations will be critical. We will be expected to achieve rapid, decisive victory predominantly by concentrated precision engagement, with minimal U.S. casualties and collateral damage.

JV 2010's 21st Century Challenges

Rapid joint force projection; decisive combat operations; integrating precision effects

Hypothesis

If **a highly deployable, decisive, agile, survivable, and supportable force can conduct a deep operational strike against an adversary's operational and strategic centers of gravity,**

Then **we can compel the adversary to concede without our having to conduct a protracted campaign.**

Desired Capabilities

- **Highly lethal, maneuverable, survivable and agile combat forces**
- **Integrated, non-kinetic options**
- **Common relevant operational picture**
- **Networked sensor packages**
- **Advanced planning and decision support tools**
- **Support synchronized to battle rhythm**
- **Flexible options for staging and insertion of forces**
- **Adaptive joint force headquarters**

Objectives

- **Rapid worldwide joint force projection**
- **Rapid penetration of opponents' sanctuaries to attack centers of gravity and decisive points**
- **Smaller friendly footprint**
- **Multidimensional positional advantage**
- **Rapid decisive operations**

Enabling

Dominant maneuver and precision engagement

Figure III–2. Rapid Decisive Operations (RDO)

OVERVIEW

Despite arms control, the proliferation of increasingly lethal conventional weapons and weapons of mass effects (WME)--capable of being launched by a variety of mobile platforms--will continue well into the 21st century. Rapid, effective operations to destroy or neutralize critical mobile air, surface, subsurface, and space targets, particularly those that can deliver WME, are essential to the success of future joint operations.

Effective operations against these targets will depend on the synergistic effects achieved by improving three critical components: intelligence, surveillance, and reconnaissance (ISR); command and control (C^2); and weapon systems. This will allow immediate identification and continuous, accurate tracking of critical targets, time-sensitive decision making, and engagement with precise, retargetable, and immediately responsive weapons and offensive information operations.

The Result: Neutralization of critical mobile targets before or soon after launch.

HIGHLIGHTS

21st Century Environment

The proliferation of increasingly lethal weapons—including WME—employed from air, surface, subsurface, and space platforms, will continue. Some adversaries will attempt to field both conventional and unconventional delivery systems. This will increase the vulnerability of military forces and jeopardize access to forward bases. Effective operations against these critical mobile targets will require new methods and capabilities.

JV 2010's 21st Century Challenges

Countering air and missile threats

Hypothesis

If we can establish a multispectral cross-cued sensor network linked by a responsive decision mechanism to precision engagement means,

Then we will be able to detect, locate, track, and destroy or neutralize critical mobile targets.

Desired Capabilities

- Networked sensors that detect, identify, and track critical mobile air, land, sea, and space targets
- Cross-sensor cueing; automatic target recognition systems; enhanced datalinks
- A joint C^2 architecture that provides near-instantaneous linkage of sensors to shooters
- Common relevant operational picture
- Advanced planning and decision support tools
- Real-time combat assessment to support dynamic retasking and reattack

Objectives

- Effective reduction of the TBM threat
- More rapid early entry and force closure
- Greater force protection
- Increased freedom of maneuver
- Precise, unrelenting application of effects
- Quicker shaping of the battlespace

Enabling

Dominant maneuver, precision engagement, and full-dimensional protection

Figure III–3. Attack Operations Against Critical Mobile Targets (AOACMT)

OVERVIEW

There are numerous operational pictures in use by the services and DoD agencies, which, from conception through fielding, had little or no emphasis on the requirement to be interoperable with other information systems. The tempo and precision of future operations demand that we develop an integrated operational picture that provides a warehouse of information required by warfighters for faster and better decisions.

With the rapid proliferation of information technology and a commitment to maintaining our information superiority, we have the opportunity to develop a global infosphere that will expand the information available to the warfighters. This "system of systems" will not only provide past and present knowledge but will also provide predictive, cognitive, and decision-making tools.

The Result: Improved battlespace awareness.

HIGHLIGHTS

21st Century Environment

The ever-changing and complex environment of the Information Age will provide seemingly limitless access to an infinite volume of information, for both ourselves and our adversaries. Forces harnessing the capabilities potentially available from improvements in information and systems integration technologies will benefit from increased battlespace awareness.

JV 2010's 21st Century Challenges

Joint C^2, battlespace awareness, information transport and processing, combat identification, and information fusion

Hypothesis

If we have a common relevant operational picture in readily understandable, scalable, filterable, and interactive format,

Then we can compress the decision cycle, react more quickly to high-tempo operational requirements, and limit risk.

Desired Capabilities

- Common information protocols, databases, and architecture
- Increased "reachback" and "reachout" capabilities
- Advanced planning and decision support tools
- Tailored displays that can aggregate and deaggregate information
- Methods to tailor incoming information to each unit's specific mission
- Interoperable combat identification

Objectives

- Shared understanding of situation and intent
- Improved synchronization of joint operations
- Rapid, highly informed decisions
- Reduction of redundancies and decreased footprint
- Global infosphere with all information required by approved users
- Prevention of fratricide

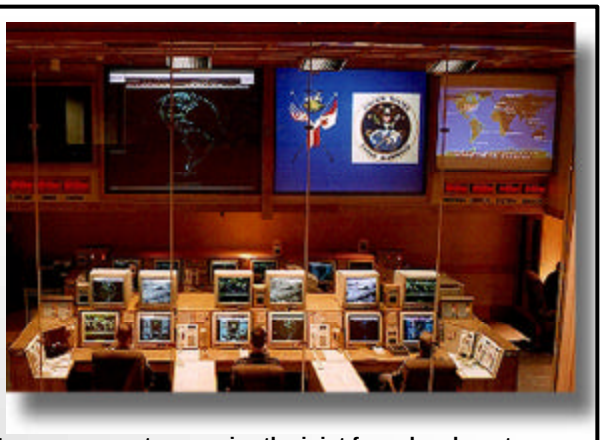
Enabling

All JV 2010 key elements

Figure III–4. Common Relevant Operational Picture (CROP)

OVERVIEW

Command and control is perhaps the single most important function in military operations. It is the means by which the JFC synchronizes joint activities in time, space, and purpose to achieve unity of effort. C^2 enables the commander to balance new operational concepts in the right mix for any assigned mission. The enduring C^2 function rests on planning, conceptualizing, applying experience, leading, and making sound decisions.



This adaptive C^2 concept investigates new ways to organize the joint force headquarters and task organize the joint force to leverage advances in information superiority and other technologies. Potential options include a reachback headquarters, a standing JTF Headquarters, a Joint Force Information Superiority Coordinator, a Joint Force Protection Commander, a Theater Weapons Cell, an Offensive Information Operations Cell, and an In-theater Joint Logistics Manager. During the experimentation process, other ways to enhance C^2 should surface and will be included in the maturing concept.

***The Result*: More efficient and effective joint C^2 at the operational level.**

HIGHLIGHTS

21st Century Environment

By 2010, we should be able to change how we conduct the most intense operations. Instead of relying on massed forces and sequential operations, we will achieve massed effects in other ways. Moreover, mission requirements and information superiority will cause decision cycles to compress. The "decide-act" link could be particularly seamless, representing the true heart of joint C^2.

JV 2010's 21st Century Challenges

Joint C^2, battlespace awareness, decisive combat operations, integrating precision effects

Hypothesis

If **we can gain information superiority and other enhancements projected by *Joint Vision 2010,***

Then **we can achieve significant efficiencies in how the Joint Force Commander organizes the headquarters and task organizes the joint force for operations.**

Desired Capabilities

- **Increased reachback capabilities**
- **Common relevant operational picture**
- **Advanced planning and decision support tools**
- **Assured, networked C^2 systems**

Objectives

- **Improved synchronization of joint operations**
- **Adaptive structuring of the joint force and the JFC's headquarters**
- **A smaller headquarters' "footprint"**

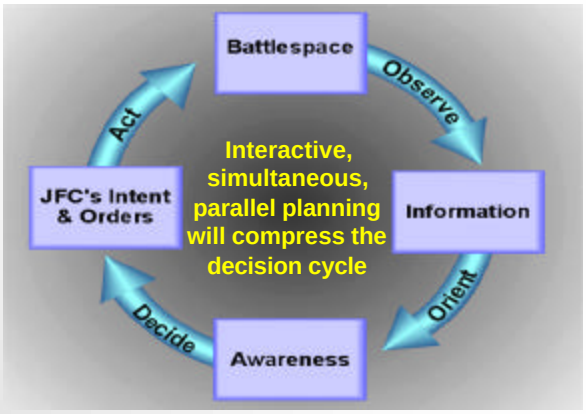
Enabling

Joint command and control and decisive operations

Figure III–5. Adaptive Joint Command and Control (AJC^2)

OVERVIEW

Planning and execution are the two actions that synchronize and sustain the application of military force so that the objectives of all battlespace functions, processes, and components are unified in a common effort. Future JFCs must be able to rapidly exploit information from a wide range of traditional and nontraditional sources to integrate fully with allies and other partners across the range of military operations.



The ability to rapidly exchange information around the globe and throughout the battlespace will force the sequential, linear planning of the past to give way to simultaneous, interactive planning, which will greatly affect the tempo of execution. In particular, simultaneous, parallel planning will shorten the "decide" component of the "observe-orient-decide-act" (OODA) cycle and will allow the JFC to gain significant leverage over the enemy counterpart.

The Result: Improved joint command and control and unity of effort.

HIGHLIGHTS

21st Century Environment

Information technologies continue to improve rapidly in quantity, quality, and responsiveness. Relevant information can be collected, processed, and analyzed to produce a common relevant operational picture for the joint force commander. Advanced information capabilities will allow us to conduct military planning in an entirely new way. Commanders and their staffs will be able to centralize their planning efforts while becoming less centralized in location.

JV 2010's 21st Century Challenges

Joint command and control, information transport and processing

Hypothesis

If we can increase our ability to plan the various elements of a joint operation in parallel rather than in sequence,

Then commanders will be able to decide and act faster than the adversary.

Desired Capabilities

- Advanced joint collaborative planning links to nontraditional information sources
- Advanced planning and decision support tools
- Common relevant operational picture
- Information assurance
- Real-time, operational- and strategic-level modeling and simulation
- Increased reachback and reachout information capabilities

Objectives

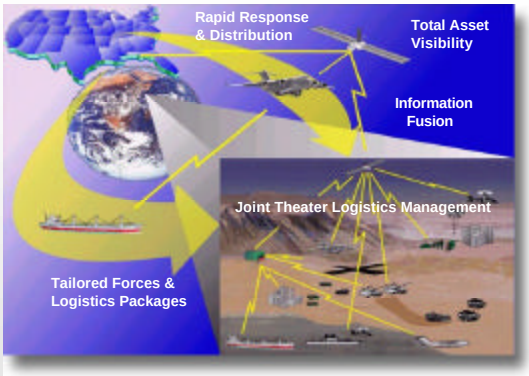
- The capacity for quicker decisions
- Unity of effort (including multinational partners)
- Dynamic tasking and retasking of assets
- Control over operational tempo
- Faster response time than the adversary

Enabling

Information superiority and joint command and control

Figure III–6. Joint Interactive Planning (JIP)

OVERVIEW



The requirement to gather, insert, distribute, and sustain logistics support for a rapid, decisive force necessitates unprecedented systems for information collection and decision support. The nature of rapid decisive operations also requires an agile delivery system capable of time-definite support to mobile combat units in multiple locations. Such logistics agility begs the issue of a joint logistics manager to prioritize and synchronize joint theater support. The fusion of information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while enroute, and to deliver tailored logistics packages directly to the user will enable rapid decisive operations.

Logistics support must be fused with the Joint Force Commander's requirements and the joint force's capabilities. Precise and time-definite delivery must be its watchword.

The Result: **Rapid, precise, agile, and synchronized support for decisive operations.**

HIGHLIGHTS

21st Century Environment

Logistics systems and practices that were "good enough" for a cold war environment are not adequate for operations in the Information Age. The demand for U.S. overseas presence is not likely to diminish. Rapid response by U.S. forces will require projecting power with capable, sustainable forces and a significantly greater "tooth-to-tail" ratio.

JV 2010's 21st Century Challenges

Joint deployment and rapid distribution, information fusion, joint theater logistics management, and agile infrastructure

Hypothesis

If **we can provide an agile, anticipatory, and responsive logistics infrastructure and decrease the logistics requirements per unit of combat power,**

Then **we can enhance force deployment and employment efficiency and provide "right-sized" support to enable rapid decisive operations.**

Desired Capabilities

- **Robust distributed networks**
- **Advanced planning and decision support tools**
- **Common processes and standards of support for multinational partners and third parties**
- **Common relevant operational picture**
- **Dynamic, integrated logistics planning, analysis, and control**
- **Agile staging and delivery platforms**

Objectives

- **Rapid commencement and conclusion of decisive operations**
- **A single "fused" logistics picture**
- **Synchronized logistics functions with battle rhythm**
- **Near-real-time management of the pipeline**
- **Assured, time-definite delivery and distribution**

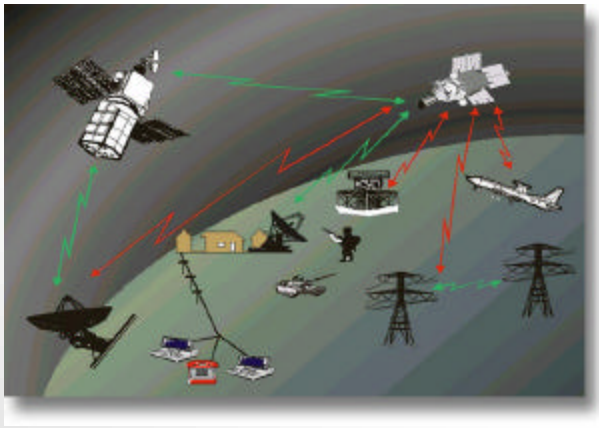
Enabling

Precision engagement, dominant maneuver, and focused logistics.

Figure III–7. Focused Logistics Enabling Early Decisive Operations (FLEEDO)

OVERVIEW

The proliferation of information-related technologies in the early 21st century can provide potential adversaries with powerful asymmetric means to influence joint operations. Offensive and defensive information operations (IO) involve actions taken to affect adversary's information and information systems while defending our own. IO can enable our NCA and combatant commanders to significantly affect an adversary even before destructive means are authorized, thus contributing to deterrence while shaping the environment.



During combat operations, effective defensive IO will protect and ensure the common relevant operational picture (CROP) that is essential for rapid decisive operations. Offensive IO that influences, disrupts, denies, exploits, and destroys adversary capabilities will simultaneously help the JFC achieve operational and strategic objectives with less use of conventional force, minimum losses, and reduced collateral effects.

The Result: **Information superiority and rapid decisive operations.**

HIGHLIGHTS

21st Century Environment

The globalization of the information environment and advancement of technology will continue at an ever-increasing pace, and our dependencies and vulnerabilities will increase exponentially. Potential agile, flexible, and difficult-to-identify adversaries, including non-nation states, may have access to the same enabling technologies. The greatest challenge will come from asymmetric attacks.

JV 2010's 21st Century Challenges

Information superiority, integration of precision effects, control of the battlespace

Hypothesis

If **we can use information operations to degrade, destroy, and exploit an adversary's critical information-based processes while defending our own,**

Then **we can provide the NCA options for limiting conflict escalation while maintaining information superiority and achieving objectives with less use of conventional force.**

Desired Capabilities

- **Common relevant operational picture**
- **Immediate and automatic detection of adversary offensive IO and capability to respond**
- **Information assurance and rapid information/ system restoration**
- **Broad-based dedicated intelligence to identify adversary vulnerabilities**
- **Integrated IO campaign planning tools**

Objectives

- **Achievement of operational and strategic objectives with less use of force**
- **Degradation of an adversary's capability to effectively use information and information systems**
- **Denial of an adversary's opportunity to exploit friendly information and information systems**
- **Degradation of an adversary's battlespace awareness, C^2, and "will" to employ forces**

Enabling

Information superiority and decisive operations

Figure III–8. Information Operations (IO)

OVERVIEW

Considerable turmoil in the world's regions will continue to produce civil strife, mass migration of refugees, famines, and even genocide well into the 21st century. These unsettling trends will be coupled with the threat of regional aggression. As the U.S. military responds, our adversaries may attempt to counter our force projection capabilities. This requires future joint forces that have responsive, credible, and sustainable forcible entry capabilities.

The U.S. military must be prepared to rapidly deploy and employ joint forces against capable adversaries who intend to deny U.S. access. The joint force must be able to integrate improvements to deployment, command and control, and combat power capabilities to secure positions from which to conduct follow-on sustained combat operations.

The Result: **Accelerated forcible entry that enables sustained combat operations.**

HIGHLIGHTS

21st Century Environment

Future adversaries will likely attempt to counter U.S. military intervention in their region. Many opponents will have access to high-technology weapons and will use effective asymmetric means as well. Offensive information operations, shallow-water and land mines, and relatively inexpensive missiles that may carry weapons of mass effects (WME) will challenge future Joint Force Commanders who are attempting forcible entry operations.

JV 2010's 21st Century Challenges

Rapid joint force projection, decisive combat operations

Hypothesis

If **we can rapidly seize positions from which to conduct follow-on sustained combat operations,**

Then **we can limit adversary success, rapidly build combat power, and accelerate mission accomplishment.**

Desired Capabilities

- **Worldwide joint force projection**
- **Flexible options for staging and insertion of forces**
- **Agile and tailorable joint force package**
- **Adaptive joint force headquarters**
- **Support synchronized to the battle rhythm**
- **Common relevant operational picture**
- **Increased reachback and reachout capabilities**

Objectives

- **Rapid enablement of follow-on operations**
- **Precise closure of joint forces in the JOA**
- **Rapid and informed decisions**
- **Rapid destruction of the adversary's will and ability to use asymmetrical means**

Enabling

Dominant maneuver and precision engagement

Figure III–9. Forcible Entry Operations (FEO)

OVERVIEW

In the 21st century, the United States and its allies will depend on their ability to provide immediate military presence to counter threats and provide regional stability. The requirement for projecting credible military capability to all corners of the globe necessitates an agile and responsive strategic deployment capability. Through the advantages provided by a worldwide information architecture, integrated joint theater logistics management, and responsive strategic lift, the JFC can be assured that force deployment to within positions of operational reach will be agile, precise, and synchronized.

Response times will likely be very short, and the deployment of military capability must be tailorable and swift. The joint force must be capable of marrying deployment assets, pre-positioned equipment, and near-theater staging alternatives into an immediate presence of combat-capable power.

The Result: **Strategic positioning of sufficient capability to ensure rapid decisive operations.**

HIGHLIGHTS

21st Century Environment

The ability and circumstances for regional aggressors to impose their will on their neighbors will continue to expand in the 21st century. Since the United States could continue to lose basing rights in or near such regions, power projection will become ever more important as a fundamental strategic concept for future joint operations.

JV 2010's 21st Century Challenges

Rapid joint force projection, joint deployment, and rapid distribution

Hypothesis

If **we can combine highly capable strategic lift, forward-basing alternatives, and mobile pre-positioned assets,**

Then **we will increase strategic agility, limit escalation, and conduct decisive operations more quickly.**

Desired Capabilities

- **Advanced planning and decision-support tools**
- **Common relevant operational picture**
- **Tailored forces and logistics**
- **Alternatives to bases and fixed ports in the JOA**
- **Heavy and supersonic intertheater airlift; fast intertheater sealift**
- **Intratheater short takeoff and landing capabilities**
- **Nontraditional use of vessels and pre-positioned craft as operating platforms**
- **Optimized use of pre-positioned assets**

Objectives

- **Projection of joint force over strategic distances**
- **Rapid transition from deployment to combat**
- **Support of rapid force intratheater maneuver**

Enabling

Dominant maneuver, precision engagement, focused logistics

Figure III–10. Strategic Deployment (SD)