RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide BA2 Applied Research					R-1 ITEM NOMENCLATURE Tactical Technology PE 0602702E, R-1 #17				
COST *(In Millions)*	FY 1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost To Complete	Total Cost
Total Program Element (PE) Cost	158.953	142.501	121.051	126.679	151.114	161.642	174.306	Continuing	Continuing
Naval Warfare Technology TT-03	19.170	14.582	0.000	0.000	0.000	0.000	0.000	0.000	N/A
Advanced Land Systems Technology TT-04	33.347	27.641	21.972	23.319	43.348	39.162	35.144	Continuing	Continuing
Advanced Targeting Technology TT-05	0.000	0.000	0.000	6.400	5.700	14.700	26.200	Continuing	Continuing
Advanced Tactical Technology TT-06	45.918	34.558	32.232	43.028	45.673	41.530	41.371	Continuing	Continuing
Aeronautics Technology TT-07	30.163	40.748	29.131	20.475	32.593	42.450	47.291	Continuing	Continuing
Advanced Logistics Technology TT-10	20.106	15.296	27.791	23.564	23.800	23.800	24.300	Continuing	Continuing
Joint Logistics ACTDs TT-11	10.249	9.676	9.925	9.893	0.000	0.000	0.000	0.000	N/A

(U) Mission Description:

(U) This program element is budgeted in the Applied Research Budget Activity because it supports the advancement of concepts and technologies to enhance the next generation of tactical systems. The Tactical Technology program element funds a number of projects in the areas of Naval Warfare, Advanced Land Systems, Advanced Targeting, Aeronautics, and Logistics technologies.

(U) The Naval Warfare Technology project is focusing on enabling technologies for a broad range of naval requirements. Programs include High Energy Density Materials and Submarine Payloads and Sensors. The High Energy Density Materials program is exploring high risk/high

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pay-off breakthroughs in missile propellants and explosives technologies. The Submarine Payloads and Sensors effort will explore submersible platforms designed to maximize payload capacity.

(U) The Advanced Land Systems Technology project is developing technologies for contingency missions, mine clearing, and anti-personnel landmine alternatives to make U.S. combat forces more deployable, effective, survivable, and affordable. The SLID program has developed and is testing a system for providing protection against missiles and projectiles with explosive warheads. The Advanced Fire Support Systems program will provide rapid response and lethality associated with gun and missile artillery, thereby increasing survivability, yet requiring fewer personnel and less logistical support. The Counter-artillery Force Protection program will explore advanced sensors, munitions and deployment concepts to counter evolving threats. The Dog's Nose/Unexploded Ordnance Detection program will develop sensors for the chemically specific detection of explosives or other chemicals, comparable to the effectiveness of canine olfaction detection. The Alternatives to Antipersonnel Landmines program will explore technologies to obviate the need for mines. The Close-In Sensing program will emphasize new approaches to detect traditionally low signal-to-signal noise or concealed targets. The Active Ballistic Imaging effort will exploit newly discovered phenomenon to facilitate surveillance and targeting in adverse weather conditions.

(U) The Advanced Tactical Technology project is exploring the application of compact lasers; high performance computational algorithms to enhance performance of radars, sensors, communications, and electronic warfare and target recognition and tracking systems; precision optics components for critical DoD applications; miniature air-launched decoy systems; affordable rapid response missile demonstrations; new tactical systems for enhanced air vehicle survivability, advanced airbreathing weapons, enabling technologies for advanced space systems; and emerging payload delivery concepts.

(U) The Aeronautics Technology project will develop and demonstrate a new family of Micro-Air Vehicles (MAVs). The MAVs will be an order of magnitude smaller than any operational UAV and will be useful in a wide variety of military missions from covert imaging and chemical/biological agent detection to communication enhancement. This project also funds the Micro Adaptive Flow Control (MAFC) program, Small-Scale Propulsion System (SSPS) concepts, the Advanced Rotorcraft Technology (ART) program, the Vertical Take-off and Landing Unmanned Air Vehicle (VTOL UAV) program, and a one-year effort to explore Supersonic Aircraft Noise Mitigation (SS A/C NM).

(U) The Advanced Logistics project is investigating and demonstrating technologies that will make a fundamental difference in transportation and logistics. The program will define, develop, and demonstrate fundamental enabling technologies that will permit forces and sustainment materiel to be deployed, tracked, refurbished, sustained, and redeployed more effectively and efficiently. The project will also develop and

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demonstrate advanced military-grade measures for security, robustness, and scalability to enable the wide-scale application of large-scale agent technology to U.S. military logistics and command and control domains operating in high-tempo conventional and information warfare environments.

(U) The Joint Logistics project is composed of two Advanced Concept Technology Demonstrations (ACTDs) that will develop and migrate interoperable web-based joint logistics decision support tools (JDSTs) to the Service logistics communities. The Joint Logistics ACTD will develop JDST capabilities in the areas of force capability assessments, logistic support concept generation and evaluation, distribution, materiel management; maintenance analysis and visualization. The Joint Theater Logistics ACTD will integrate and expand those capabilities to provide realtime in-theater management and analysis tools. Focus areas for the Joint Logistics project correspond to Commander-In-Chief (CINC) and Service requirements to develop JDSTs.

(U) Program Change Summary: (*In Millions*)

	FY1999	FY 2000	FY 2001
Previous President's Budget	169.759	137.626	123.937
Current Budget	158.953	142.501	121.051

(U) Change Summary Explanation:

FY 1999	Decrease reflects SBIR reprogramming; transfer of Simulation Based Design Program to the Defense Logistics Agency; and Section 8058 rescission.
FY 2000	Increase reflects net effect of congressional program reductions; congressional adds for CEROS and Supersonic Aircraft Noise Mitigation; the government-wide rescission; and minor program adjustments.
FY 2001	Decrease reflects net effect of: transition of the Micro Air Vehicles program (Project TT-07); cancellation of the Simulated Battlefield Imagery program (Project TT-04); completion of the Naval Warfare Technology Project (TT-03); and increases for the expansion of the Affordable Rapid Response Missile Demonstrator (Project TT-06) and Advanced Logistics efforts (Project TT-10).

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COST *(In Millions)*	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Naval Warfare Technology TT-03	19.170	14.582	0.000	0.000	0.000	0.000	0.000	0.000	N/A

(U) Mission Description:

(U) The Naval Warfare Technology project develops advanced technologies for application to a broad range of naval requirements. The principal enabling technologies include investigation into High Energy Density Materials (HEDM) for advanced explosives and propellants and innovative payload and platform concepts for expanding the envelope of operational capabilities for submersible platforms.

(U) The High Energy Density Materials (HEDM) program fosters high-risk/high payoff efforts that could result in major breakthroughs in missile propellant and explosives technologies applicable to a wide variety of tactical and strategic military systems. The HEDM project will investigate the synthesis of new molecules capable of providing orders of magnitude increases in explosive and/or propulsive energy per unit weight. The stability and energy content of several such molecules have been predicted theoretically. The molecules will contain only nitrogen atoms or a very high percentage of nitrogen atoms, a situation that makes their production and use environmentally friendly. The potential benefits include: thermodynamic properties which could result in their having two-to-six times as much propulsive/explosive energy as current state-of-the-art operational materials, the "greening" of production and use, and reduction of detectability. Missile systems with size constraints could have increased range, maneuverability for flexible targeting, and/or increased kill effectiveness due to improvements in both the propellant's thrust and the warhead's lethality (per weight and volume). The program builds on theoretical work previously sponsored by other DoD organizations and provides some high risk excursions into materials which are theoretically possible but for which there is no currently known defined synthetic route.

(U) Current submarine designs are significantly limited in the quantity and types of payloads and sensors that can be accommodated; in turn, these limitations increasingly constrain the view of the future operational utility of the submarine platform. The Submarine Payloads and Sensors Program is intended to explore the possibilities that emerge when a unified set of payload and sensor concepts, operational implications, and supporting platform concepts are formulated in a balanced manner. Flexible platform concepts will be evaluated to support future multiple payload/sensor approaches that include the areas of advanced ordnance, advanced sensors, and adjuvant vehicles. Technology and programmatic roadmaps for the interlocking payload, sensor, combat system and platform concepts that evolve will be defined as part of this effort.

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(U) Program Accomplishments and Plans:

(U) FY 1999 Accomplishments:

- Project Genoa. ($ 6.116 Million)
  - Demonstrated Phase I initial operational capability of the data retrieval and visualization capability, initial operational capability of the crisis modeling capability, and began installation of modeling capability and integration with data retrieval capability at CINCPAC and DIA. Began installation and integration of advanced presentation capability. Transitioned Phase I application effort to PE0603760E, Project CCC-01.

- High Energy Density Materials (HEDM). ($ 1.744 Million)
  - Produced new, stable, all nitrogen Ion N_5^+. One of only 3 stable all nitrogen species (N_2, discovered 1772 and N_5^-, discovered 1890).
  - Obtained spectrographic indications of N_4.
  - Continued development of synthesis pathways and theoretical chemistry support activities for High Energy Density Materials.
  - Investigated methods to scale-up successful synthetic routes to production quantities.

- Submarine Payloads and Sensors. ($ 4.366 Million)
  - Commenced concept development phase to define innovative concepts in advanced ordnance, advanced sensors, and adjuvant vehicles applicable to submarine platforms.
  - Created two initial payload concepts together with associated mission concepts. Commenced initial concept refinement and initiated utility assessments. Continued development of additional concepts.

- Center of Excellence for Research in Ocean Sciences (CEROS). ($ 6.944 Million)
  - Continued most promising ocean science efforts at the CEROS.

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(U) FY 2000 Plans:

- High Energy Density Materials (HEDM). ($ 4.678 Million)
  - Scale up synthesis of High Energy Density Materials (HEDM) to gram quantities and experimentally verify physical properties.
  - Attempt synthesis of novel nitrogen molecules ($N_5^+ N_3$).

- Submarine Payloads and Sensors. ($ 2.904 Million)
  - Complete concept development phase, refining and finalizing multiple payload and sensor concepts and associated mission concepts.
  - Define and mature two flexible platform concepts capable of supporting multiple payload and sensor concepts.
  - Identify development roadmaps and technology risks and opportunities associated with the final system and platform concepts.

- CEROS. ($ 7.000 Million)
  - Select projects for funding, either new efforts or follow-on development to projects selected in previous years.
  - Contract selected projects and monitor progress of ocean related technologies of high interest to the DoD and the State of Hawaii.
  - Effect the transition of appropriate products to military and civilian use.

(U) FY 2001 Plans:

- Not Applicable.

(U) Other Program Funding Summary Cost:

- Not Applicable.

(U) Schedule Profile:

- Not Applicable.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide BA2 Applied Research				R-1 ITEM NOMENCLATURE Tactical Technology PE 0602702E, Project TT-04					
COST *(In Millions)*	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Advanced Land Systems Technology TT-04	33.347	27.641	21.972	23.319	43.348	39.162	35.144	Continuing	Continuing

(U) Mission Description:

(U) This project is developing technologies for enhancing the US military effectiveness and survivability in operations ranging from force-on-force conflict to military Operations-Other-Than-War (OOTW). This emphasis is on developing affordable technologies that will enhance the military's effectiveness while decreasing the exposure of US or allied forces to enemy fire. This project consists of the following main efforts: Small Low-cost Interceptor Device (SLID); Advanced Fire Support Systems (AFSS); Counter-artillery Force Protection (CFP); Dog's Nose/Unexploded Ordnance Detection; Alternatives to Antipersonnel Landmines; Close-In Sensing; and Active Ballistic Imaging.

(U) The SLID program is developing and testing a system that protects threatened systems against missiles and projectiles with explosive warheads. The SLID system will detect, track and intercept threats such as anti-armor missiles, mortars, artillery, and top-attack sensor fused munitions at a standoff distance sufficient to render them ineffective. Applications for the SLID system include: self-defense of vehicles; defense of high value fixed sites such as command centers, hospitals, embassies, parked aircraft and radars; and, with further development, self defense of naval platforms and low-speed aircraft. A completing program, FY 1999 was the final year of DARPA funding for SLID.

(U) The Advanced Fire Support Systems (AFSS) program will develop and test a containerized, platform-independent multi-mission weapon concept. These systems will provide rapid response and lethality in packages requiring significantly fewer personnel, decreased logistical support, and lower life-cycle costs, while increasing survivability compared to current gun and missile artillery. AFSS will allow the military to capitalize on recent advances in military doctrine and infrastructure, such as the ongoing digitization of the Army. The program will develop and demonstrate highly flexible systems including a modular, multimission precision missile, a remotely commanded self-locating launcher, and a command and control system compatible with military doctrine. Beginning in FY 2001, the Advanced Fire Support System will be a key element supporting beyond-line-of-sight engagements for Future Combat Systems and is funded in PE 0603764E, Project LNW-03, Future Combat Systems.

(U) The Counter-artillery Force Protection (CFP) program will develop concepts for defending forces and civilian enclaves against air threats including high rate of fire missile artillery carrying submunitions. The program will explore advanced sensors, munitions and deployment concepts to counter this evolving threat, and will include both active defense and counterforce options.

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(U) The Dog's Nose/Unexploded Ordnance (UXO) Detection program will develop sensors for the chemically specific detection of explosives or other chemicals characteristic of land mines and/or shallowly buried UXOs. The sensors developed under this program will provide soldiers with the effectiveness of canine olfaction detection without the logistics and other constraints imposed by the use of live animals. These chemically specific sensors will work either singly or in conjunction with other technologies such as the hyperspectral mine detector, developed under the Small Unit Operations (SUO) program in PE0603764E, project LNW-02 that exploit different physical features.

(U) DARPA is developing technologies that provide alternatives to antipersonnel landmines (APLs) under this project. The systems developed will provide our warfighter with enhanced capabilities that obviate the need for APL. Technologies include self-healing antitank (AT) minefields (that allow the protection of AT mines without the use of APLs) and tags with minimally guided munitions that allow the compression of critical timelines and distance constraints imposed by conventional indirect and direct fire approaches.

(U) The Close-in Sensing program will develop technologies to complement our national remote sensing assets (space and airborne). The close-in sensors will exploit various phenomenologies to make robust detection, classification, and identification of mobile time-critical targets and characterization of the local radio frequency (RF) environment. The technologies developed will emphasize new approaches to detect traditionally low signal-to-noise or concealed targets.

(U) The Active Ballistic Imaging program will explore a newly discovered phenomenon that allows "seeing" through smoke, fog, and rain. This effort will conduct experiments to understand the phenomenon and develop the ultra short pulse laser technology, holographic beam control, and the fast gated imaging sensor technology.

(U) Program Accomplishments and Plans:

(U) FY 1999 Accomplishments:

- Small Low-cost Interceptor Device (SLID). ($ 5.322 Million)
  - Completed testing of interceptor system.

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- Completed testing of fire control system.
- Transitioned ground vehicle active protection technology to Army.

- Unexploded Ordnance Detection. ($ 20.020 Million)
  - Conducted field demonstrations of a prototype chemically specific land mine detector paired with other sensors.
  - Investigated plume-tracing strategies in support of future search strategies.
  - Characterized chemical signatures of land mines in a variety of environments.
  - Conducted a series of blind tests to establish current sensor capabilities.
  - Conducted a prototype field demonstration in the Balkans.

- Advanced Fire Support System (AFSS). ($ 8.005 Million)
  - Continued feasibility analysis of advanced technologies for integration into platform/missile system components.
  - Developed detailed designs for the Advanced Fire Support System architecture.
  - Conducted evaluations and testing of high risk and critical components.
  - Defined system demonstration objectives.

(U) **FY 2000 Plans:**

- Advanced Fire Support System (AFSS). ($ 13.119 Million) [Future Combat Systems – related = $13.119 Million]
  - Complete detailed design for AFSS objective demonstration system, including launch, fire control, and each of the demonstration flight systems.
  - Develop and test component hardware and software for AFSS.
  - Continue advanced concept feasibility assessments.
  - Initiate hardware-in-the-loop tests.
  - Plan and initiate limited objective flight tests.

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- Counter-artillery Force Protection (CFP). ($ 1.094 Million)
  - In conjunction with the Army, define one or more system architectures, including sensors, munitions and deployment to meet the mission needs for enclave protection against missile artillery.

- Unexploded Ordnance Detection. ($ 6.457 Million)
  - Continue the development of chemical sniffers for land mine detection.
  - Reduce size, improve field response to interferents, and improve sampling system.
  - Demonstrate a condensed phase detector in the field in multiple configurations (handheld and vehicle mounted) and formalize transition with the user.

- Alternatives to Antipersonnel Landmines. ($ 6.971 Million)
  - Begin preliminary development of antitank minefield healing algorithms.
  - Conduct initial demonstration of self-healing antitank mine subsystems – individual mine-surrogate mobility concepts and mine-to-mine communication methods.
  - Develop and demonstrate tagging concept(s) in the laboratory.

(U) **FY 2001 Plans:**

- Alternatives to Antipersonnel Landmines. ($ 9.925 Million)
  - Conduct field demonstration of self-healing antitank minefield using surrogate mines.
  - Demonstrate adhesion of tags in the field.
  - Demonstration of in-field wakeup and down-range communication with tags.

- Close-in Sensing. ($ 9.547 Million)
  - Investigate potentially promising radio frequency phenomenology collection techniques.
  - Develop novel tagging technologies.
  - Assess data exfiltration schemes.

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- Active Ballistic Imaging. ($ 2.500 Million)
  - Conduct phenomenology experiment.
  - Perform preliminary system performance modeling and assessment.

(U) Other Program Funding Summary Cost:

- Not Applicable.

(U) Schedule Profile:

- Not Applicable.

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COST *(In Millions)*	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Advanced Tactical Technology TT-06	45.918	34.558	32.232	43.028	45.673	41.530	41.371	Continuing	Continuing

(U) Mission Description:

(U) This project focuses on five broad technology areas: (a) compact, efficient, frequency-agile, diode-pumped, solid-state lasers for infrared countermeasures, laser radar, holographic laser sensors, and high-power laser applications; (b) high performance computational algorithms for signal processing, target recognition and tracking, electromagnetic propagation, and processing of advanced materials and microelectronics; (c) precision optics components for critical DoD applications; (d) aerospace electronic warfare systems (e.g. coherent spoofers, decoys, jammers); and (e) very high speed aerospace vehicle and enabling technology (Affordable Rapid Response Missile Demonstrator). Additionally, this project will develop new tactical systems for enhanced air vehicle survivability, advanced airbreathing weapons, enabling technologies for advanced space systems, and emerging payload delivery concepts.

(U) Compact Lasers: This program will develop compact diode-pumped, solid-state lasers and laser-diode arrays (10x improvement in efficiency) with tens of watts average power output and wavelength tuneability in the mid-infrared spectral regions to provide laser sources for infrared countermeasures against heat-seeking missiles for rotary wing/fixed wing aircraft and sea-borne platforms. Additionally, it will develop ultra broadband and very short pulse solid state laser technology and ultra high power short pulse lasers. The program will explore a combination of microelectromechanical systems (MEMS) based electro-optic spatial light modulators in combination with very short pulse solid state lasers to provide powerful new capabilities for secure communication up-links (multi-gigabits per second), aberration free 3-dimensional imaging and targeting at very long ranges (> 1000 kilometers). Lastly, innovative design concepts and system integration of MEMS based spatial light modulators (SLMs), which provide a quantum leap in wavefront control, photonics and high speed electronics, will be explored for an affordable and high value communications, image sensing and targeting system for use well into the 21st century.

(U) High Performance Algorithm Development and Advanced Mathematics for Microstructural Process Control: these programs will identify, develop, and demonstrate new mathematical paradigms enabling maximum performance at minimum cost in a wide variety of DoD systems applications. They will look for opportunities to aggressively leverage the power of mathematical representations in order to effectively exploit the power of large-scale computational resources as they apply to specific problems of interest. The products are typically advanced algorithms and design methodologies. DARPA is pursuing the development of well-conditioned fast algorithms and strategies for the exploitation of high-

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dimensional data (i.e., data with a high number of degrees of freedom) in order to deal with a variety of complex military problems such as adaptive array processing for missile seekers, waveform design for spaceborne sensors and communication applications, virtual integrated prototyping of advanced material processing, efficient high fidelity scattering computations for radar cross sections, and efficient mapping of signal processing kernels onto advanced DoD hardware architectures.

(U) Precision Optics: The Precision Optics program will develop mathematical design tools and fabrication strategies for conformal sensor windows, cylinders, toroids, and diffractive optical elements. These tools and strategies, once developed, will provide distortion-free imaging with greater than hemispherical field-of-regard and reduced aerodynamic drag for precision strike and integrated bomb damage assessment for next-generation airborne platforms/high-speed missiles.

(U) Aerospace Electronic Warfare Systems: The Miniature Air-Launched Decoy (MALD) advanced concept technology development (ACTD) program will develop and demonstrate a small, inexpensive air-launched decoy system for Suppression of Enemy Air Defenses (SEAD). MALD will be employed to enhance the survivability of friendly aircraft by establishing air superiority through stimulating, diluting and confusing enemy Integrated Air Defense Systems (IADS). The jointly funded Air Force, OSD/AT&L, and the DARPA program's major focus is affordability. DARPA, together with the Air Force Air Combat Command only has one requirement for the program: An Average Unit Flyaway Price (AUFP) of $30,000 per decoy for a 3,000 unit buy. The design will leverage the Small Engine Application Program SENGAP engine program, miniaturization of electronics, and commercial equipment and process to achieve design goals. Other applications of the miniature air vehicle system to employ other electronic warfare approaches, which include coherent radio frequency (RF) spoofers, and RF jammers.

(U) The Affordable Rapid Response Missile Demonstrator (ARRMD): The ARRMD will destroy high value targets in heavily protected areas at long standoff ranges, quickly and affordably. Generally, the ARRMD program is pursuing a highspeed air breathing propulsion system that will more than triple the installed specific impulse (ISP) of current rocket power systems. The ARRMD program will prove technologies that could enhance future large scale, high speed payload delivery systems and access to space systems.

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(U) Program Accomplishments and Plans:

(U) FY 1999 Accomplishments:

- Compact Lasers. ($ 4.200 Million)
  - Demonstrated and delivered a brassboard high powered mid-infrared laser for ship based closed loop infrared countermeasures.
  - Demonstrated quantum cascade laser diode arrays operating at mid-infrared wavelengths.

- High Performance Algorithm Development. ($ 11.800 Million)
  - Validated prototype electromagnetic scattering models for objects in ground clutter.
  - Demonstrated data, sensor, and algorithm fusion algorithms for signal and image processing applications that exploit the feature extraction capability of wavelets.
  - Demonstrated fast algorithms for electromagnetic scattering at subwavelength scales and off rough surfaces.
  - Demonstrated feasibility of mathematical approaches to creating optimal portable applications libraries for selected computational kernels required in complex physical process simulations.

- Advanced Mathematics for Microstructural Process Control. ($ 7.869 Million)
  - Developed algorithms for fundamental chemical calculations that allow treatment of larger systems and more extended phenomena in thin film deposition.
  - Developed multiresolution homogenization techniques to reduce systems of partial differential equations to equations amenable to process optimization and design of control algorithms.
  - Validated island dynamics mathematical model and level set methods for epitaxial growth.

- Precision Optics Technology. ($ 3.750 Million)
  - Demonstrated replicated conformal missile domes.
  - Demonstrated designs for conformal missile domes.
  - Demonstrated assembly of conformal missile domes for laboratory characterization.

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- Miniature Air-Launched Decoy (MALD). ($ 11.107 Million)
  - Continued operational demonstrations; acquired limited flight clearance (Seek Eagle); fabricated thirty-two operational test assets and transitioned to Services.
  - Completed feasibility study to validate that a low cost interceptor derivative can be developed from a MALD. Established preliminary and final design after cost and performance trades. Determined seeker design options and turbine engine integration.
  - Continued to explore other concepts for low cost MALD airframes to fill mission areas such as reconnaissance, surveillance, nuclear/biological/chemical (NBC) detection, jamming, etc.

- Affordable Rapid Response Missile Demonstrator (ARRMD). ($ 5.892 Million)
  - Completed propulsion integrated flowpath and manufacturability demonstrations.
  - Conducted vehicle force and moment testing.
  - Conducted Warfighting Analysis Lab exercises.
  - Started system preliminary design.
  - Continued exploration of supporting technologies for hypersonic missiles.
  - Refined unit cost estimate.
  - Down-selected to single concept (Waverider).

- Rapid Domination. ($ 0.500 Million)
  - Conducted exploratory study to examine the concept of rapid dominance.
  - Analyzed the impact of a very rapid and punitive military response to an adversary's aggression.

- Advanced Tactical Technology Concepts. ($ .800 Million)
  - Continued feasibility evaluation studies of emerging advanced tactical technology concepts, including high-speed launch of small payloads, autonomous maintenance capabilities, and beyond next generation space-based sensors.

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(U) **FY 2000 Plans:**

- Compact Laser. ($ 5.577 Million)
  - Develop system applications concept and preliminary design of spatial light modulators and integrated electronics for Coherent Communications, Imaging and Targeting (CCIT).
  - Perform feasibility studies and concept development of enabling alignment and docking technologies using compact solid state laser technology for advanced space-based systems.

- Precision Optics. ($ 7.160 Million)
  - Complete assembly and test of conformal optics Stinger missile dome to quantify performance improvements.
  - Demonstrate imagery through Stinger conformal missile dome.

- High Performance Algorithm Development. ($ 8.487 Million)
  - Demonstrate utility of multiscale segmentation and registration algorithms in DoD automatic target recognition applications.
  - Develop advanced mathematical algorithms for high throughput hyperspectral infrared imaging.
  - Validate fast algorithms for electromagnetic scattering at subwavelength scales and off of rough surfaces.
  - Develop codes for predicting antenna radiation patterns and scattering off of electrically large, smooth impenetrable bodies.

- Advanced Mathematics for Microstructural Process Control. ($ 2.936 Million)
  - Construct and test control/optimization codes for sputtering, evaporation and molecular beam epitaxy reactors.
  - Extend level set methodology to complex diffusion processes in thin film processing.

- Miniature Air-Launched Decoy (MALD). ($ 1.940 Million)
  - Continue operational assessment exercises with thirty-two test assets to support transition to Air Force.
  - Continue to investigate ACTD design shortfalls and testing anomalies. Support redesign efforts to increase reliability.

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- Affordable Rapid Response Missile Demonstrator (ARRMD). ($ 7.958 Million)
  - Conduct booster configuration trade study.
  - Conduct second force and moment test series.
  - Perform design optimization studies.
  - Select demo booster configuration.
  - Conduct structural validation testing.
  - Complete system preliminary design.
  - Continue exploration of supporting technologies for hypersonic missiles.
  - Initiate Phase II activities.
  - Initiate detailed vehicle design.
  - Complete flight test plan for first flight articles.

- Advanced Tactical Technology Concepts. ($ .500 Million)
  - Explore and assess feasibility of new concepts for high-speed launch of small payloads and autonomous maintenance capabilities, exploiting next generation space-based sensors (e.g. lasers, electro optic, and millimeter wave).

(U) **FY 2001 Plans:**

- Compact Lasers for Coherent Communications, Imaging and Targeting. ($ 1.985 Million)
  - Develop breadboard system with high-speed electronics integration.
  - Demonstrate greater than 1-kilometer operation for static platform and target.
  - Develop very high power short pulse lasers using plasma based pulse compression.

- High Performance Algorithm Development. ($ 9.000 Million)
  - Demonstrate feasibility and portability of optimized portable application library generation approaches for a complete signal-processing algorithm.
  - Develop and test algorithms for variable precision filters for adaptive signal processing.
  - Develop tool set implementing algorithmic, memory, and compilation models applied to a multipole test problem.

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- Develop algorithms for predicting and optimizing antenna radiation patterns and scattering, both off of and through inhomogeneous materials and deep cavities.
- Develop computationally efficient geometric compression and registration algorithms for topography/imagery databases.

- Advanced Mathematics for Microstructural Process Control. ($ 1.918 Million)
  - Validate reduced order model and algorithms for sensing and control of thin film vapor deposition processes.
  - Demonstrate advanced molecular dynamics/accelerated molecular dynamics simulation techniques for the growth of multilayer materials.

- Affordable Rapid Response Missile Demonstrator (ARRMD). ($ 17.866 Million)
  - Conduct high mach number wind tunnel testing.
  - Conduct critical design review.
  - Initiate fabrication of missile demonstrators.
  - Continue exploration of supporting technologies for hypersonic missiles.
  - Initiate flight weight engine ground demonstrator test hardware fabrication.
  - Develop hybrid rocket as a low cost booster.

- Advanced Tactical Technology Concepts. ($ 1.463 Million)
  - Perform feasibility evaluation studies of emerging advanced tactical technology concepts, including enhanced air vehicle survivability, innovative engines and propulsion techniques, payload delivery methods, and enabling technologies for advanced space systems.

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(U) Other Program Funding Summary Cost: *(In Millions)*

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	Cost to Complete	Total Cost
MiniatureAir-Launched Decoy (MALD)	1.000	.500	0.000	0.000	0.000	0.000	0.000	N/A

PE 0603750D, Advanced Concept Technology Demonstrations

(U) Schedule Profile:

- Not Applicable.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide BA2 Applied Research				R-1 ITEM NOMENCLATURE Tactical Technology PE 0602702E, Project TT-07					
COST *(In Millions)*	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Aeronautics Technology TT-07	30.163	40.748	29.131	20.475	32.593	42.450	47.291	Continuing	Continuing

(U) Mission Description:

(U) Aeronautics Technology efforts will address high payoff opportunities to dramatically reduce costs associated with advanced aeronautical systems and/or provide revolutionary new system capabilities for satisfying current and projected military mission requirements.

(U) A new family of Micro-Air Vehicles (MAVs) that are at least an order of magnitude smaller than current flying systems (less than 15 cm in any dimension) will be developed and demonstrated. The capability to accomplish unique military missions as diverse as small unit reconnaissance and surveillance, support of military operations in urban terrain, targeting and tagging high-value targets in denied areas, and, biological-chemical agent detection and characterization, will be stressed through an examination of a variety of vehicle concepts. The resulting capability should be especially beneficial in the emerging urban warfighting environment, characterized by its complex topologies, confined spaces and areas (often internal to buildings), and high civilian concentrations. The MAV program will focus on the technologies and components required to enable flight at these small scales, including flight control, power and propulsion, navigation and communications. These will build upon and exploit numerous DARPA technology development efforts, including advanced communications and information systems, high performance computer technology, Microelectromechanical Systems (MEMS), advanced sensors, lightweight, efficient high density power sources, and advanced electronic packaging technologies.

(U) Micro Adaptive Flow Control (MAFC) technologies enable control of large-scale aerodynamic flows using small-scale actuators. MAFC technologies combine adaptive control strategies, distributed sensor arrays, and advanced actuator concepts like micro-scale synthetic jets, MEMS-based microactuators, pulsed-blowing and smart structures to delay or prevent fluid flow separation. MAFC technologies will be explored for a wide range of applications such as adaptive lift-on-demand for agile missiles and uninhabited tactical aircraft, lightweight gas turbine engines, and low-drag, non-intrusive methods to aerodynamically steer projectiles for extended range and precision. Advanced flow control concepts will be explored in the context of system level performance benefits and cost assessments. MAFC technology evaluations will be made under system-relevant flow conditions, and the most promising approaches will be selected for component- or system-level demonstration.

(U) The goals of the Advanced Rotorcraft Technology (ART) program are to investigate the merits of various advanced rotorcraft technologies and to conduct technology maturation efforts for two such technologies: face gear, split torque transmissions, and variable diameter tilt

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rotors. The current ART program consists of the following tasks: Task 1 will complete design and fabrication, and perform tests of a full scale split torque helicopter main rotor transmission based on face gear technology; a unique gear grinding process that enables production grinding of aircraft quality face gears. The project will yield a completed 2,828 horsepower demonstrator transmission, and will perform testing of the design's concentric face gear split torque concept, durability improving modifications to gears and smaller subsystem tests. Steps required to do this include furthering the face gear manufacturing technology developed to-date to enable precision-grinding of the large demonstrator transmission face gears, instrumenting of the test gears, assembly of the gearbox, and performing tooth backlash and pattern development, slow roll tests, split torque concept tests and durability tests. These tests will determine tooth strength and torque split percentages for the design concept. Task 2 will consist of tests and experiments to investigate and mature Variable Diameter Tilt Rotor (VDTR) technology. The tilt rotor concept, as embodied in the V-22 aircraft, and as previously demonstrated in the XV-1 and XV-15 prototype aircraft, attempts to achieve the speed of a turboprop aircraft combined with the vertical takeoff and landing capability of a helicopter. This is accomplished through a mechanism that translates the vertical, lifting plane of a helicopter to the horizontal, thrusting plane of a propeller. The size of the rotor/propeller in the aforementioned applications is compromised between that desired for a lifting rotor (large diameter) and that size desired for a thrusting propeller (small diameter). The VDTR concept is an attempt to optimize both the rotor size and the propeller size by including a mechanism that extends and retracts the diameter of the rotating airfoils. While such a design is theoretically feasible and has been demonstrated in small-scale wind tunnel experiments, the concept involves considerable mechanical complexity and aerodynamic challenge. Task 3 is a research project to create a knowledge base and computer code to analyze the operational merit of advanced rotorcraft technologies such as Variable Diameter Tilt Rotor (VDTR), Face Gears, Microadaptive-Flow Control, and Smart Materials. This study will also address the relative merits of such technologies when applied in short takeoff, vertical landing (STOVL) aircraft as contrasted with vertical takeoff, vertical landing (VTOL) aircraft.

(U) Concepts for a new, small-scale class of propulsion systems will be developed in the size range from 0.5 cm to 5.0 cm in diameter, with thrust levels from 10 g to 10.0 kg. They will enable future development of a new generation of very small weapons and military platforms including micro air vehicles, unmanned combat air vehicles, missiles and space launch vehicles. Radical new capabilities to be explored range from shirt-button-sized micro gas turbine and micro rocket engines to 5-cm scale gas turbine and pulse detonation engines. Technologies, which may enable these systems, may be explored at larger scale to prove feasibility. Examples of new mission capabilities may include delivery of very small (200g) satellites to low earth orbit, light weight, long endurance miniature reconnaissance vehicles, and extended range small scale precision munitions. These small-scale munitions would complement emerging unmanned vehicle systems and greatly increase mission capabilities by simultaneously increasing loadout, range and precision.

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(U) DARPA, in partnership with the Office of Naval Research and industry, formulated a program to explore two innovative new vertical take-off and landing (VTOL) concepts with the potential for significant performance improvements that would satisfy stressing mission needs. The first concept, an advanced Canard Rotor/Wing (CRW) aircraft, offers the potential for a high speed (350 knots), rapid response capability from a VTOL unmanned air vehicle (UAV) with significant range (500 nm) and stealth improvements as compared to other VTOL concepts. The second concept (A160) exploits a hingeless, rigid, rotor concept to produce a VTOL UAV with very low disk loading and rotor tip speeds resulting in an efficient low power loiter and high endurance system. The VTOL UAV program transitioned to PE 0603285E in FY 2000.

(U) The Supersonic Aircraft Noise Mitigation program is directed towards the development of a vehicle capable of long range missions with sustained supersonic flight with low takeoff noise and mitigated sonic boom. Highly integrated vehicle concepts will be explored to simultaneously meet the cruise range and noise level goals. Advanced airframe technologies will be explored to minimize sonic boom and vehicle drag. High performance propulsion systems will be developed to permit long-range supersonic flight with low takeoff and cruise noise levels.

(U) Program Accomplishments and Plans:

(U) FY 1999 Accomplishments:

- Micro Air Vehicle (MAV). ($ 12.213 Million)
  - Conducted MAV system development and fabrication. Continued exploration and demonstration of flight enabling technologies and subsystems. Initiated flight test planning for propelled rotary-wing and fixed-wing reconnaissance vehicle systems incorporating operational templates, design flight capabilities, and mission characteristics. Initiated advanced MAV concept definition.
  - Conducted assessment of small-scale air-breathing and rocket propulsion systems. Systems evaluated included micro-turbojet and micro-rocket engines, pulsed combustor engines, and miniature gas turbine and pulse-detonation engines. Initiated development of Small Scale Propulsion Systems program.

- Micro Adaptive Flow Control (MAFC). ($ 5.381 Million)
  - Completed studies of MAFC feasibility for high work compressors, advanced inlet and maneuvering technologies, and rotary and tilt wing hover vehicles.
  - Initiated development and demonstration of MAFC actuator and controller technologies for system-relevant flow conditions.

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- VTOL Concepts. ($ 12.569 Million)
  - Completed detailed designs, analyses, simulations and component tests.
  - Conducted engineering, endurance and ground tests.
  - Completed wind tunnel and full scale propulsion system/rotor testing of the Canard Rotor/Wing (CRW) concept.
  - Initiated fabrication of two CRW demonstrators and three A160 demonstrators.
  - Conducted initial flight tests of A160 flight control systems on a Robinson R-22 helicopter modified for unmanned flight.

(U) FY 2000 Plans:

- Micro Air Vehicle (MAV). ($ 8.006 Million)
  - Complete development of flight enabling technologies for micro air vehicles.
  - Complete fabrication, flight testing and demonstration of multiple fixed-wing and rotary-wing MAV systems.
  - Complete development of MAV compatible power and propulsion subsystems, autonomous navigation and control subsystems, and sensor subsystems.
  - Continue concept of operations evaluation for military use.

- Micro Adaptive Flow Control (MAFC). ($ 8.695 Million)
  - Explore new approaches to MAFC actuator and controller development.
  - Continue to assess actuator, sensor, and control system performance, control authority, bandwidth and power requirements.
  - Explore integration of MAFC technology into feasibility demonstrations for selected military applications, including high-work compressors and fixed-and rotary wing air vehicles.

- Small Scale Propulsion Systems (SSPS). ($ 4.606 Million)
  - Complete concept evaluation of several small-scale propulsion systems, including turbines, rockets and internal combustion designs.
  - Begin detailed design of selected systems for brassboard testing.

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- Advanced Rotorcraft Technology (ART). ($ 3.179 Million)
  - Conduct design work on the face gear, split torque helicopter transmission, including ice and exposure to sand as well as extreme hot and cold ambient temperature conditions.

- Advanced Aeronautic Concepts. ($ 1.262 Million)
  - Conduct technology assessments and feasibility testing of advanced aeronautic concepts, including supersonic laminar flow, air-to-air resupply and continuous aerodynamic control surfaces.

- Supersonic Aircraft Noise Mitigation (SS A/C NM). ($ 15.000 Million)
  - Develop technologies for long range supersonic aircraft having low sonic boom and noise signature, range augmentation through low vehicle drag, and advanced propulsion systems.
  - Develop highly integrated systems concepts for a supersonic long range aircraft.

(U) **FY 2001 Plans:**

- Micro Air Vehicle (MAV). ($ 0.646 Million)
  - Complete advanced MAV development including system fabrication and all flight-testing; complete military concept of operation evaluation and complete transition of MAV systems to Services.

- Micro Adaptive Flow Control (MAFC). ($ 12.903 Million)
  - Initiate fully controlled MAFC technology development and testing.
  - Initiate studies to integrate MAFC technologies into full-scale engine and aircraft systems.

- Small Scale Propulsion Systems. ($ 9.925 Million)
  - Complete design for propulsion systems.
  - Complete subsystem fabrication.
  - Begin subsystem checkout and brassboard demonstrations.

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- Advanced Rotorcraft Technology (ART). ($ 5.657 Million)
  - Complete design work and begin manufacturing of a face gear helicopter transmission.
  - Complete reliability testing of extension/retraction and locking mechanisms for the variable diameter tilt rotor.

(U) Other Program Funding Summary Cost:

- Not Applicable.

(U) Schedule Profile :

- Not Applicable.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide BA2 Applied Research				R-1 ITEM NOMENCLATURE Tactical Technology PE 0602702E, Project TT-10					
COST *(In Millions)*	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Advanced Logistics Technology TT-10	20.106	15.296	27.791	23.564	23.800	23.800	24.300	Continuing	Continuing

(U) Mission Description:

(U) The overarching objective of the Advanced Logistics Technology project is to revolutionize the way the DoD plans, executes, monitors, and dynamically replans logistics support across the entire spectrum of operational environments from day-to-day routine peacetime operations, disaster relief, non-combatant evacuation, peacekeeping, peacemaking, and minor and major contingencies. The project consists of two major programs, the Advanced Logistics Program and the UltraLog Program.

(U) The Advanced Logistics Program will investigate and demonstrate technologies that will make a fundamental difference in transportation and logistics. The program will define, develop, and demonstrate fundamental enabling technologies that will permit forces and sustainment material to be deployed, tracked, refurbished, sustained, and redeployed more effectively and efficiently than ever before. Currently, this is accomplished using isolated, independent, and sometimes incompatible systems, processes and data. Therefore, the very rapid replanning and redirection necessary to support missions involving simultaneous local and major regional conflicts cannot be accomplished today. The Advanced Logistics Program will address these shortcomings and enable this significant capability to be developed. In addition, the program has enormous potential for cost savings through greatly improved management of transportation and logistics assets. ALP will develop automated, multi-echelon, collaborative logistical/transportation technologies that will provide warfighters with an unprecedented capability to monitor, rapidly replan, and execute the revised logistics plan as the situation requires, even while assets are enroute to the theater. The Advanced Logistics Program will focus on the following three areas: 1) development of applications providing a technology environment that allows warfighters to rapidly understand and assess the logistics and transportation implications of a crisis situation, to generate effective plans and courses of action, to monitor a plan's execution and to use that information to re-plan; 2) automated systems that will enable significant efficiency improvements in transportation and logistics, such as improving access to data, monitoring the condition and status of shipments, personnel, inventories, logistics assets and the infrastructure, the creation of "plan sentinels" to serve as an early warning system for plan deviations, and improved theater distribution; and 3) development of a computer network infrastructure that allows distributed real-time visualization and interaction with all phases, elements and components of the military and commercial transportation infrastructure. The capabilities from these three areas will be integrated to demonstrate a prototype end-to-end system solution. The use of agent technology remains the best approach to maintaining information superiority of the future battlespace. However, full and effective fielding of this technology also requires revolutionary new approaches and extensive systemic architecture

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analysis and experimentation to create a wartime infrastructure that is known and trusted to be secure, robust and scalable. ALP will also perform a preliminary investigation of the basic military-grade measures for security, scalability and robustness to enable the wide-scale application of large-scale agent technology to U.S. military logistics and command and control domains operating in high-tempo conventional and information warfare environments. A number of areas related to security, scalability and robustness to extend and enhance the ALP architecture will be analyzed. Starting with the ALP baseline, Architecture Red Teams will evaluate the features and deficiencies of each capability or combination of capabilities. The product of this analysis will serve as the roadmap and objectives for the UltraLog program, to begin in FY 2001.

(U) The UltraLog Program will build on the baseline security, robustness and scalability investigation and analysis during the Advanced Logistics Program and develop and demonstrate advanced military grade measures for security, robustness, and scalability to enable the wide-scale application of large-scale agent technology to U.S. military logistics and command and control domains operating in high-tempo conventional and information warfare environments. UltraLog's approach will be to start with the infrastructure developed by the Advanced Logistics Program (ALP). UltraLog will pursue research breakthroughs in four main areas: (1) Security: Investigate information pedigree, white-noise generation, dynamic random routing, agent gateways, dynamic PKI key management, recovery reconstruction protection, dynamic communications and security measures, information rovers, correlation and isolation of compromised agents and other techniques to achieve a secure, trusted system even under directed information warfare attack; (2) Scalability: Investigate assured convergence, automatic dampeners, adaptive configuration, resource pooling/proxy, variable fidelity processes, sliding temporal horizons, ultra-efficient agent negotiations, reactive plan space management and other techniques to achieve a highly scalable and stable system even under very chaotic wartime environments; (3) Robustness: Investigate non-local persistence, fault tolerance and recovery, distributed consistency checking, partial state validation, dynamic communications-aware redundancy, dynamic adaptation, temporal horizons and other techniques to achieve a state of high survivability under frequent and significant failure warfare environments; and (4) Systems Integration and Development: Synergistically combine security, scalability and robustness techniques that will provide the highest level of capability while ensuring the overall functionality of the distributed logistics enterprise is preserved. Though many of the research efforts will be accomplished independently and in parallel, the real challenge will come in the integration synergy of the various techniques to produce the desired systemic effects. Architecture Red Teams will also be used to evaluate the features and deficiencies of each capability or combination of capabilities, annually. These evaluations will drive the following year's focus, expanding where there is promise and curtailing what has proven ineffective. Each year the evaluation environment will become more complex, the requirements greater, and the evaluation space expanded to eventually create the most brutal information warfare environment possible in an experimental environment.

(U) The Advanced Logistics Technology project supports Joint Vision 2010, US Transportation Command, Defense Logistics Agency, and Service initiatives, and is coordinated with other related logistics efforts within the DoD. As these technologies mature, they will immediately

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transition to other joint initiatives which include the Defense Logistics Agency's Logistics Research and Development Demonstration (PE0603712S), the Joint Logistics Advanced Concept Technology Demonstrations (Project TT-11), and eventually to the Global Command and Control System (GCCS) and the Global Combat Support System.

(U) Program Accomplishments and Plans:

(U) FY 1999 Accomplishments:

- Advanced Logistics Program. ($ 20.106 Million)
  - Demonstrated an integrated environment to support the planning, execution and monitoring of a unit deployment from point of debarkation through in-theater distribution, including automated infrastructure assessment and monitoring.
  - Developed and demonstrated the ability to negotiate the exchange of information between suppliers and buyers, including rapid, flexible item and item relationship catalogs for automated sustainment processing.
  - Developed automated deviation detection and triggering of the replanning processes. Continued development of a dynamic critical items list for sustainment planning and execution. Developed and demonstrated automated medium grained course of action evaluation that is linked to the war plan.

(U) FY 2000 Plans:

- Advanced Logistics Program. ($ 15.296 Million)
  - Develop capability to automatically plan and schedule movements from installation to the theater of operations and integrate the resulting movement plan with operations within the theater. Demonstrate capability for users to visualize multiple facts of the transportation schedule.
  - Develop capability to dynamically manage stockage levels across multiple supply chain levels and, multiple echelons, services and agencies.
  - Develop capability to automatically notify users when projected completion of an executing task differs from planned timeline.

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- Construct and conduct a detailed baseline analytical evaluation of the Advanced Logistics Program architecture for security, scalability and robustness.
- Begin to establish the development and experimental environments, to include necessary security considerations and classifications for large-scale experimentation of agent societies under kinetic and information warfare environments.

(U) FY 2001 Plans:

- Advanced Logistics Program. ($ 9.925 Million)
  - Develop capability to automatically build and compare logistics plans in support of four operational courses of action in four hours.
  - Develop capability to monitor resource information, availability, capacity, costs and to view past, present and projected logistical situations.
  - Conduct a pilot test of advanced logistic technology using the Focused Logistics Wargame 2001.
  - Develop plans for conducting follow-on pilot tests.

- UltraLog. ($ 17.866 Million)
  - Complete establishment of development and experimental environments.
  - Design, develop and evaluate a variety of security, scalability and robustness technologies that demonstrate the potential for solving various aspects of the UltraLog problem space, with special attention to proving the feasibility of each technique and determining the probability of success based on the technical and functional requirements of each approach.
  - Perform systemic analysis of combinations and layering of developed technologies for overall effectiveness under varying experimental and environmental conditions.

(U) Other Program Funding Summary Cost:

- Not Applicable.

(U) Schedule Profile:

- Not Applicable.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide BA2 Applied Research				R-1 ITEM NOMENCLATURE Tactical Technology PE 0602702E, Project TT-11					
COST *(In Millions)*	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Joint Logistics ACTDs TT-11	10.249	9.676	9.925	9.893	0.000	0.000	0.000	0.000	N/A

(U) Mission Description:

(U) The Joint Logistics project is composed of two Advanced Concept Technology Demonstrations (ACTDs) that will develop and migrate interoperable web-based joint logistics decision support tools (JDSTs) to the Global Combat Support System (GCSS). The focus area for the Joint Logistics ACTD (JL ACTD) addresses Commander-in-Chief (CINC) and Service requirements to develop JDST capability in the areas of Force Capability Assessment; Logistics Support Concept Generation and Evaluation; Distribution, Materiel Management, Maintenance Analysis; and Visualization. The second ACTD, the Joint Theater Logistics ACTD (JTL ACTD) integrates and expands those and other capabilities to provide real-time management and analysis tools for logistics and operations interoperability. Tools developed in this second ACTD are called Joint Theater Logistics Decision Support Tools (JTLDSTs) to distinguish them from the JDSTs developed for the JL ACTD and to emphasize the focus upon forces associated with a Joint Task Force in a theater of operations. JDSTs/JTLDSTs will use maturing technologies to provide warfighters and logisticians with the abilities to: assess support force capabilities to perform mission tasks; develop and evaluate logistics operational support plans; monitor logistics operations; and, react to deviations from projected support. These tools will exploit near real-time logistics data sources and will be available to all users via a web-based client-server environment that complies with defense information infrastructure (DII) common operating environment (COE) architecture standards and requirements. JTL tools will provide the fusion and correlation of plans and information for critical components of theater support, sustainment, and transportation systems providing effective management, analysis, and situational awareness to the logistics commanders. JTL capabilities will include real-time interoperability between logistics and operations during all phases of planning and execution. Key data sources include Joint Total Asset Visibility (JTAV), Joint Personnel Asset Visibility (JPAV), the Global Transportation Network (GTN), the Joint Operational Planning and Execution System (JOPES), and the Global Status of Readiness and Training System (GSORTS). This project will also provide a migration path for evaluating advanced technologies that are being developed by other projects such as the DARPA Advanced Logistics Technology Project (TT-10) and the Adaptive Course of Action Advanced Concept Technology Demonstration (PE0603750D). The JL and JTL ACTDs will support CINC/Joint Task Force (JTF) and Service/Agency logisticians across the entire operational spectrum -- mobilization, deployment, employment, sustainment and redeployment.

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(U) Program Accomplishments and Plans:

(U) FY 1999 Accomplishments:

- Joint Logistics ACTD. ($ 10.249 Million)
  - Developed data access and mediation capability to pull information from disparate data sources and to share data and JDST data products between applications through a common user interface.
  - Expanded tool set functionality focusing on Component and Service needs. Derived and graphically displayed planned force capability estimates for logistics units throughout the deployment sequence at specific nodes over time.
  - Determined, evaluated, displayed, and compared logistics support concepts to include unit capabilities and select supply class requirements to support one or more operational courses of action.
  - Developed the framework to track and visualize the inventory status, flow, and consumption of sustainment stocks.

(U) FY 2000 Plans:

- Joint Logistics ACTD. ($ 4.838 Million)
  - Expand development of Joint Decision Support Tools (JDSTs) to compare planned logistics unit support capabilities with actual capabilities at specific nodes over time.
  - Develop the capability to generate a below-the-line logistics force structure based upon the operational course of action and demonstrate the capability to provide a qualitative force capability assessment of the force structure.
  - Exercise and demonstrate advanced JDST capabilities in an expanded joint warfighting exercise.
  - Transition proven JDST capability through the Advanced Information Technology Services (AITS) Joint Program Office (JPO) into the Global Combat Support System.

- Joint Theater Logistics (JTL) ACTD. ($ 4.838 Million)
  - Begin development of Joint Theater Logistics Decision Support Tools (JTLDSTs)
  - Start development of computer-assisted capabilities to evaluate operational and logistics tasks.
  - Initialize capability to calculate support unit requirements and sustainment and identify matching sources to meet mission requirements.

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- Incorporate logistics support capabilities and operational concepts into a single integrated view.
- Prepare to demonstrate JTL capabilities in a joint warfighting exercise.

(U) FY 2001 Plans:

- Joint Logistics ACTD. ($ 1.000 Million)
  - Transition Joint Decision Support Tools (JDST) capability through the Advanced Information Technology Services (AITS) Joint Program Office (JPO) into the Global Combat Support System.

- Joint Theater Logistics (JTL) ACTD. ($ 8.925 Million)
  - Expand JTLDST capability to integrate in-theater distribution support planning and infrastructure assessment, and to generate and compare alternative logistics support force concepts to support multiple operational courses of action. Track the execution of sourcing and sustainment from closure through dissemination throughout the theater.
  - Incorporate and enhance planned deviation detection technology and sentinels to compare planned resource requirements with near real-time operational logistic activity for select support items by location, provider, and intended consumer.
  - Develop capability to rapidly assess the impact of operational changes upon the logistics support structure. Develop a real-time in-theater management capability for critical resources including fuel and munitions, which integrates execution of logistics support plans with logistics and operational data feeds.
  - Develop the capability to forecast the impact of deviations and alternative support concepts upon future operations.
  - Demonstrate multi-echelon interoperability and in-theater management capabilities in a joint warfighting exercise.

(U) Other Program Funding Summary Cost:

- Not Applicable.

(U) Schedule Profile :

- Not Applicable.