RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2002	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide BA2 Applied Research				R-1 ITEM NOMENCLATURE Tactical Technology PE 0602702E, R-1 #18					
COST *(In Millions)*	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost To Complete	Total Cost
Total Program Element (PE) Cost	210.790	164.056	180.952	188.667	192.180	194.836	200.361	Continuing	Continuing
Naval Warfare Technology TT-03	4.965	23.389	28.952	33.736	23.777	19.884	0.000	0.000	N/A
Advanced Land Systems Technology TT-04	14.293	23.448	24.000	53.636	73.305	84.016	103.701	Continuing	Continuing
Advanced Tactical Technology TT-06	28.439	61.468	69.000	53.636	57.455	61.283	67.070	Continuing	Continuing
Aeronautics Technology TT-07	27.432	23.635	37.000	22.845	27.737	29.653	29.590	Continuing	Continuing
Advanced Logistics Technology TT-10	26.791	22.529	22.000	24.814	9.906	0.000	0.000	0.000	N/A
Joint Logistics ACTDs TT-11	9.570	9.587	0.000	0.000	0.000	0.000	0.000	0.000	N/A
Unmanned Systems TT-12	99.300	0.000	0.000	0.000	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, Aeronautics, and Logistics technologies. FY 2001 included congressionally added funding for Unmanned Systems initiatives (Project TT-12).

(U) The Naval Warfare Technology project is focusing on advanced enabling technologies for a broad range of naval requirements. The Friction Drag Reduction program will develop friction drag reduction technologies for surface ships and submersibles. The Hypersonics Flight

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Demonstration program will develop and demonstrate advanced technologies for hypersonic flight. This project also included funding for the Center of Excellence for Research in Ocean Sciences.

(U) The Advanced Land Systems Technology project is developing technologies for enhancing the U.S. military's effectiveness and survivability in operations ranging from force-on-force conflict to military Operations-Other-Than-War. 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 Guided Projectiles program focuses on highly maneuverable projectiles, launch systems and fire control. The Training Superiority program will create revolutionary new training techniques. Networking Extreme Environments will address integration of ultra wide band communications and sensor systems.

(U) The Advanced Tactical Technology project is exploring the application of compact and solid state 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; aerospace electronic warfare systems; high speed aerospace vehicle and enabling technology; and 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 explores technologies to reduce costs associated with advanced aeronautical systems and provide revolutionary new capabilities for current and projected military mission requirements. This project funds development of micro adaptive flow control technologies; small-scale propulsion system concepts; innovative vertical take-off and landing concepts; long endurance unmanned air vehicle concepts; and advances for tilt-rotor aircraft.

(U) The Advanced Logistics Technology project investigates and demonstrates 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 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.

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(U) The Joint Logistics project, composed of two Advanced Concept Technology Demonstrations (ACTD), will develop and migrate interoperable web-based joint logistics decision support tools (JDST) to the Service logistics communities.

(U) The Unmanned Systems project pursued the development of unmanned advanced capability aircraft and ground combat vehicles consistent with Public Laws 106-259 and 106-398. Systems developed under this project included the Air Force and Naval Unmanned Combat Air Vehicles (UCAV) and Army Future Combat Systems (FCS).

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

	FY 2001	FY 2002	FY 2003
FY02 Amended President's Budget	215.896	173.885	153.348
Current Budget	210.790	164.056	180.952

(U) Change Summary Explanation:

FY 2001 Decrease reflects the SBIR reprogramming and minor program repricings.

FY 2002 Decrease reflects congressional program reduction partially offset by the CEROS Add.

FY 2003 Increase reflects increased Agency emphasis on weaponry (high power lasers) and hypersonics.

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COST *(In Millions)*	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost to Complete	Total Cost
Naval Warfare Technology TT-03	4.965	23.389	28.952	33.736	23.777	19.884	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. Enabling technologies include concepts for expanding the envelope of operational naval capabilities.

(U) The Friction Drag Reduction program will further develop friction drag reduction technologies investigated under PE 0601101E, Project MS-01, for surface ships and submersibles that can be practically implemented in the operational environment. The goal is the development of radical skin friction drag reduction sustained over time periods that are operationally relevant. The primary focus of this program is on two methods known to reduce friction drag: injection of polymers or microbubbles into the flow boundary layer. The program will address, by means of computation and small-scale laboratory experiments, the practical barriers to the implementation of polymer additives and microbubbles. Other drag reduction techniques that are discovered by these investigations will also be explored.

(U) The Hypersonics Flight Demonstration program (HyFly) will develop and demonstrate advanced technologies for hypersonic flight. Flight-testing will be initiated as early in the program as possible and progress from relatively simple and low-risk tests through the demonstration of an increasingly more difficult set of objectives. The ultimate goals of the program are to demonstrate a vehicle range of 600 nautical miles with a block speed of 4,400 feet per sec, maximum sustainable cruise speed in excess of Mach 6, and the ability to deploy a simulated or surrogate submunition. Technical challenges include the scramjet propulsion system, lightweight, high-temperature materials for both aerodynamic and propulsion structures, and guidance and control in the hypersonic flight regime. Recently demonstrated performance in ground testing of the dual combustion ram-jet engine coupled with advances in high temperature, light weight aerospace materials are enabling technologies for this program. The program will pursue a dual approach. The core program will focus on development and demonstration of capabilities requisite for and operational weapon. A separate effort will be performed in parallel to demonstrate advanced propulsion technologies and develop low-cost test techniques. DARPA is negotiating with the Navy to establish a joint program to pursue areas of the hypersonics program that would be relevant to maritime applications.

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(U) The Center of Excellence for Research in Ocean Sciences (CEROS) supports the Department of Defense by encouraging leading edge research and development in ocean sciences, exploiting exceptional Hawaiian ocean research facilities, involving highly specialized small businesses with recognized expertise in ocean related research, and providing access to the ocean sciences expertise of the University of Hawaii. Major research areas of interest have included shallow water surveillance technologies, ocean environmental preservation, new ocean platform and ship concepts, ocean measurement instrumentation, and unique properties of the deep ocean environment. Recent transitions of CEROS sponsored research into military and civilian applications indicate the success that DARPA has achieved in maturing these kinds of maritime technologies. DARPA and the Department of the Navy are currently in the process of investigating the possibility of transferring the management of the CEROS project to the Department of the Navy.

(U) Program Accomplishments and Plans:

(U) FY 2001 Accomplishments:

- Center of Excellence for Research in Ocean Sciences (CEROS). ($4.965 Million)
  - Selected projects for funding, both new efforts and follow-on development to projects selected in previous years.
  - Contracted selected projects and monitored progress of ocean related technologies of high interest to the DoD.
  - Transitioned appropriate products to military use.

(U) FY 2002 Plans:

- Friction Drag Reduction. ($5.600 Million)
  - Develop methodology for scaling drag reduction results previously demonstrated in concept evaluations to larger scale models appropriate for predicting the drag reduction in operationally relevant systems.
  - Validate initial modeling efforts through small-scale laboratory experiments.

- Center of Excellence for Research in Ocean Sciences (CEROS). ($4.700 Million)
  - Select projects for funding, both new efforts and 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.
  - Transition appropriate products to military use.

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- Hypersonics Flight Demonstration (HyFly). ($13.089 Million)
  - Perform preliminary and detailed design efforts and supporting materials-structural demos.
  - Conduct freejet aero-propulsion testing of the heavyweight vehicle configuration.
  - Perform ground test verification (static firing) of government furnished equipment supersonic low altitude target boosters.
  - Conduct captive carry, drop, boost performance and boost separation flight tests.
  - Conduct sled test of simulated submunition deployment.
  - Perform advanced combustion systems proof of concept testing in gun-launched test range.

(U) FY 2003 Plans:

- Advanced Naval Warfare Technology Concepts. ($1.952 Million)
  - Perform feasibility studies of emerging advanced technology concpets, including propulsion systems, active protection and survivability, enhanced maneuverability and hybrid electric power.

- Hypersonics Flight Demonstration (HyFly). ($27.000 Million)
  - Perform vehicle subsystems verification testing.
  - Conduct flightweight vehicle freejet performance and durability testing.
  - Conduct flightweight vehicle environmental testing.
  - Conduct initial, low flight Mach (~Mach 4.0) flight testing.
  - Conduct ballistic and free-flight subscale testing of advanced engine technologies.

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

- 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 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost to Complete	Total Cost
Advanced Land Systems Technology TT-04	14.293	23.448	24.000	53.636	73.305	84.016	103.701	Continuing	Continuing

(U) Mission Description:

(U) This project is developing technologies for enhancing the U.S. 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 U.S. or allied forces to enemy fire. This project consists of the following main efforts: Antipersonnel Landmines Alternatives; Close-In Sensing; Guided Projectiles, Networking Extreme Environments (NetEx); and Training Superiority.

(U) The Antipersonnel Landmine Alternative (APLA) program is developing technologies that provide our warfighter with enhanced capabilities that obviate the need for antipersonnel landmines (APLs). Technologies under investigation include self-healing minefields that achieve protection of antitank mines from both dismounted and mounted breaches without the use of APLs, and tags with minimally-guided, air-guided or ground-guided munitions to detect, locate and rapidly engage dismounted infantry permitting the compression of critical timelines and distance constraints that limit the effectiveness of conventional indirect and direct fires.

(U) The Close-In Sensing program will develop technologies and platforms to complement our national remote sensing assets. The close-in sensors will exploit various phenomenologies to make robust detection, classification, and identification of time-critical targets, hardened, hidden and highly protected targets and characterization of the local radio frequency (RF) environment. The technologies developed will emphasize new hardware and approaches to detect traditionally low signal-to-noise or concealed targets without placing people in harm's way and will emphasize infiltration and exfiltration technologies.

(U) The Guided Projectiles program will develop and demonstrate highly maneuverable gun-launched projectiles, launch system and fire control for point defense against highly maneuverable anti-ship cruise missiles, ground-to-air and ground-to-ground threats. The supersonic interceptors provide high rate, multiple engagement defense of critical tactical or strategic assets, including naval surface ships, airborne ISR platforms, and fixed radar/C3 sites. Supersonic flight control for aggressively maneuvering medium caliber projectiles will be developed and integrated into advanced projectile designs to achieve lateral accelerations far exceeding those achieved by “course-correcting” projectiles.

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(U) The Networking Extreme Environments (NetEx) program seeks to develop and integrate technologies that will enable, from the perspective of unattended sensors: (1) a thorough understanding of the effect of Ultra Wide Band (UWB) system operation on other spectrum users, and UWB system and channel properties; (2) improve the link margin of UWB hardware by 20dB and reduce the size and power consumption of the devices by more than an order of magnitude; (3) modify emerging ad-hoc routing and multiple access protocols to utilize the unique capabilities of UWB systems; and (4) develop a series of stressing demonstrations that will require integration of the UWB communications and sensors systems into an interoperating net to support military operations in harsh urban terrain. NetEx is an outgrowth of sensor reachback and connectivity research conducted under the Close-In Sensing program.

(U) The Training Superiority program will create new approaches to provide the Land Warrior and other warfare areas with increased technical and physical competence as a result of revolutionary new training techniques developed in this program. Passive teaching approaches, including web-based training, will not succeed in instilling the skills and knowledge needed in the new land battlefield, where there are expected to be higher demands on fewer soldiers, including the need to control and interact with highly technical unmanned systems. These new training approaches will include elements of human-tutor interactions and the emotional involvement of computer games coupled with the fidelity and feedback of Combat Training Center learning.

(U) Program Accomplishments and Plans:

(U) FY 2001 Accomplishments:

- Antipersonnel Landmine Alternatives. ($10.522 Million)
  - Conducted initial field experiments of self-healing minefield system.
  - Demonstrated autonomous location of individual mines and minefield mapping.
  - Evaluated tag communication range.

- Close-In Sensing. ($3.771 Million)
  - Investigated potentially promising radio frequency phenomenology collection techniques.
  - Investigated extremely lightweight, low cost active array technologies.
  - Explored multiple mission platform concepts.

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(U) **FY 2002 Plans:**

- Antipersonnel Landmine Alternatives. ($9.281 Million)
  - Integrate final self-healing minefield system concept.
  - Build and field test 50 mine prototypes.
  - Evaluate collective behaviors for breaching in simple minefields.

- Close-In Sensing. ($8.371 Million)
  - Continue trade off studies in advanced technologies for use in data infiltration and exfiltration.
  - Continue development of active array technologies.
  - Explore multi-sensor architectures and waveforms.
  - Initiate novel radio frequency exploitation concepts.
  - Investigate novel platform propulsion and drag reduction concepts.
  - Develop a test methodology to obtain a thorough understanding of how UWB systems interact with other spectrum users.
  - Design a flexible hardware UWB transmitter emulator.
  - Design a software UWB channel simulator.

- Guided Projectiles. ($5.796 Million)
  - Develop, model and validate supersonic flight control technologies.
  - Initiate system-level concepts and error budgets.
  - Conduct preliminary development and evaluation of key subsystem technologies.

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(U) FY 2003 Plans:

- Close-In Sensing. ($3.545 Million)
  - Complete active array component proof-of-concept.
  - Laboratory demonstration of novel data infiltration/exfiltration approaches.
  - Evaluate platform design to meet special mission needs.

- Guided Projectiles. ($6.455 Million)
  - Select one or more guidance and control system components and integrate them on projectiles of various sizes.
  - Perform initial flight demonstrations and target acquisition demonstrations.
  - Use virtual prototypes and simulations to determine the increase in effectiveness over “dumb” bullets; evaluate the logistic cost savings.
  - Fabricate and test critical subsystems for projectile maneuvering, guidance and data transmission.
  - Conduct detailed design and feasibility tests of key fire control, lethality, flight control and launch components.

- Antipersonnel Landmine Alternatives. ($2.000 Million)
  - Evaluate warhead and control electronics constraints for reduction of mine size.
  - Transition self-healing minefield concept to Services.
  - Develop initial design of RF tag; test macroscopic tag analog for initial demonstration of detectability.
  - Initial design of mortar mounted RF seeker and mortar control system.
  - Investigate potential mobility alternatives for a “tick” like munition attached to a host.
  - Evaluate potential microlethality approaches to be carried on the “tick” like munition.

- Networking Extreme Environments. ($6.000 Million)
  - Conduct Ultra Wide Band (UWB) interference testing.
  - Verify software simulator results with actual test data.
  - Issue UWB interference testing report.

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- Training Superiority. ($6.000 Million)
  - Define subject domains amenable to application of new training approaches.
  - Begin development of prototype training systems with reach-back to subject matter experts.
  - Establish approaches for modeling a student's knowledge and mental state that can be used to modify training approaches in real time.

(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-06					
COST *(In Millions)*	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost to Complete	Total Cost
Advanced Tactical Technology TT-06	28.439	61.468	69.000	53.636	57.455	61.283	67.070	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. 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) The Laser program will develop compact diode-pumped, solid-state lasers (ten fold improvement in efficiency) with at least 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. These programs will develop and demonstrate single mode fiber lasers with output powers of nearly one kilowatt from a single aperture. Tens of kilowatts output power and capability to scale to greater than hundreds of kilowatts output power and beyond will be demonstrated through coherent combination of the output power from multiple fiber lasers. High power fiber lasers will provide a quantum leap in defense capabilities by simplifying the logistic train and providing a deep magazine, limited only by electronic power, in a compact footprint. The advent of high power, reliable diodes with tunable ultra-short pulse widths and scaleable irradiance levels represents a technological advance of great potential utility to the DoD. The successful demonstration of a compact, efficient, and powerful laser diode could lead to incredible advances in communications, ultra-short pulse spectroscopy, micro-machining, LIDAR and directed energy applications with performance benefits with respect to its size, efficiency, and damage potential. These programs will also 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 three-dimensional imaging and targeting at very long ranges (greater than 1,000 kilometers). Lastly, innovative design concepts and system integration of MEMS-based spatial light modulators (SLMs), that 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 systems for use well into the 21st century.

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(U) The Mission Specific Processing (MSP) program, previously funded from PE 0602301E, Project ST-19, High Performance and Global Scale Systems, extends Adaptive Computing Systems (ACS) technologies to support the design of highly optimized embedded processors that are required in the most severely constrained DoD applications. ACS developed new approaches to the design of computer hardware that incorporated dynamic configuration capabilities. The technology developed by the MSP program will facilitate high performance processing in future space based and miniature aero systems (unmanned air vehicles and missiles) that require extremely high processing throughput while consuming the minimum possible volume, weight and power. The focus is on compressing the design time for such full custom designs to match that of standard cell systems, while providing a ten fold gain in performance.

(U) The High Performance Algorithm Development and Advanced Mathematics for Microstructural Process Control programs identify, develop and demonstrate new mathematical paradigms enabling maximum performance at minimum cost in a 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-dimensional data (i.e., data with a high number of degrees of freedom) in order to deal with a variety of complex military problems including virtual integrated prototyping of advanced material and device processing, digital representation and analysis of terrain and other geospatial data, efficient high fidelity scattering computations of radar scattering for predictive design and exploitation of radar cross sections, and efficient automatic mapping and optimization of signal processing kernels onto advanced DoD computational hardware architectures.

(U) The Integrated Sensing and Processing (ISP) program will open a new paradigm for application of mathematics to the design and operation of DoD sensor/exploitation systems and networks of such systems by developing and applying novel optimization methodologies for integrating sensing, processing, and information exploitation functionality in DoD sensor systems. This program will create tools enabling the design and global optimization of advanced sensor system architectures comprising fully interdependent networks of functional elements, each of which can fill the roles and functions of several distinct subsystems in current generation sensor systems. Payoffs will include improved performance with reduced complexity hardware and software in a wide variety of systems, including agile adaptive arrays for missile seekers, unmanned air vehicles, and spaceborne sensors; novel waveforms, adaptive waveform design and processing for object identification in dispersive and turbulent media; and novel approaches to multiplexed hyperspectral chemical/biochemical sensing systems.

(U) The Responsive Access, Small Cargo, Affordable Launch (RASCAL) program will develop and demonstrate the capability to launch small (less than 110 pounds) satellites and commodity payloads into low Earth orbit on demand and for a total launch cost of $10,000 per pound or

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less. This capability will enable cost effective use of on-orbit replacement and re-supply. This capability will also provide a means for rapid launch of orbital assets for changing national security needs. While the payload cost goal is commensurate with current large payload launch systems, it is more than a factor of five less than current capabilities for dedicated launch of payloads of this small size. This program will utilize reusable aircraft technology for the first stage and will take advantage of low-cost hybrid advanced rocket fuel technologies for the expendable upper stages. With recent advances in design tools and simulations this program will prudently reduce design margins and trade-off system reliability to maximize cost effectiveness. This program will also leverage advancements in autonomous range safety; first-stage guidance; and predictive vehicle health diagnosis, management and reporting to lower the recurring costs of space launch. FY 2003 and out funding for this program will be continued under PE 0603285E, Project ASP-02.

(U) The Water Rocket program will support research and development of a robust concept for space power and propulsion supported by water as a replenishable propellant and fuel. Water is an inexpensive and easily handled propellant. The program will develop and demonstrate thrusters that use water or its constituents, hydrogen and oxygen. High power thrusters will be developed for rapid maneuvering and high specific impulse thrusters will be developed for greater economy in use of the water propellant. A regenerative fuel cell system, enabled by emerging new technologies, will be developed and demonstrated. The regenerative fuel cell will serve two purposes: 1) it will convert the water to hydrogen and oxygen for use in thrusters, and 2) it will generate electricity while converting some of the hydrogen and oxygen back to water, thereby replacing the heavy batteries routinely used in satellites to supply electric power during nighttime. As a result of this program, future spacecraft will be more easily refueled for extensive maneuvering and changes of orbit to accomplish advanced missions.

(U) Program Accomplishments and Plans:

(U) FY 2001 Accomplishments:

- Compact Lasers for Coherent Communication, Imaging and Targeting. ($7.602 Million)
  - Developed preliminary system application concepts and preliminary design of spatial light modulators and integrated electronics. Developed preliminary breadboard system design with high-speed electronics integration.
  - Investigated very high power, short pulse lasers using plasma based pulse compression.

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- High Performance Algorithm Development. ($10.791 Million)
  - Demonstrated feasibility and portability of optimized portable application library generation approaches for a complete signal-processing algorithm.
  - Developed and tested algorithms for variable precision filters for adaptive signal processing.
  - Developed a tool set implementing algorithmic, memory and compilation models applied to a multipole test problem.
  - Developed algorithms for predicting and optimizing antenna radiation patterns and scattering, both off of and through, inhomogeneous materials and deep cavities.
  - Developed computationally efficient geometric compression and registration algorithms for topography/imagery databases.

- Advanced Mathematics for Microstructural Process Control. ($5.661 Million)
  - Validated reduced order model and algorithms for sensing and control of thin film vapor deposition processes.
  - Demonstrated advanced and/or accelerated molecular dynamics simulation techniques for the growth of multilayer materials.

- Advanced Tactical Technology Concepts. ($4.385 Million)
  - Performed 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.

(U) FY 2002 Plans:

- Compact Lasers for Coherent Communication, Imaging and Targeting. ($7.669 Million)
  - Develop 32x32 unit cell with scalable designs for spatial light modulator with integrated electronics.
  - Develop breadboard system with application specific hologram processor, receiver and short pulse amplifier.
  - Demonstrate greater than one-kilometer operation for static platform and target.

- High Power Lasers. ($10.263 Million)
  - Develop large mode-field area fiber designs and perform fabrications techniques.
  - Develop multiple designs for coherent combining of greater than 100 fiber lasers.

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- Model and evaluate concepts for ultra-short pulse widths and high irradiance.
- Demonstrate divergence angles of ~0.1°.
- Demonstrate tunable pulse widths from continuous wave to 10 nsec.
- Develop very high power, short pulse lasers using plasma based pulse compression.
- Investigate high power lasers with liquid gain medium.

- Mission Specific Processing (MSP). ($9.691 Million)
  - Conduct simulation and benchmarking of initial custom design techniques.
  - Verify ten fold improvement in giga operations per second watts per square centimeter operations per second for key Digital Signal Processor functions.
  - Develop detailed system architecture of wideband adaptive radar/electronic intelligence /seeker receiver.
  - Begin development of a wideband adaptive radar receiver based on custom cell libraries and module generators.
  - Select the target semi-custom, full scale chips for development.

- High Performance Algorithm Development/Virtual Electromagnetic Testrange. ($11.000 Million)
  - Demonstrate validated, high fidelity, efficient electromagnetic scattering prediction at frequencies up to X-band for cruise missile sized objects with simple boundary conditions (i.e., perfect electrical conductor and impedence boundary condition).
  - Demonstrate tool kit software for optimized design for thin film vapor deposition processes including real-time process control.
  - Demonstrate prototype tensor product language compilers for efficient automatic generation of digital filterbank algorithms.
  - Initiate design of digital representations for map and terrain imagery that will support highly efficient storage, query, and registration of geographical information from disparate sources.
  - Demonstrate localized representations for high-altitude gravity data with the precision of current representations with ten percent of current storage requirements.

- Integrated Sensing and Processing. ($6.000 Million)
  - Develop and demonstrate feature extraction and three-dimensional imaging capability in passive interferometric sensors.
  - Demonstrate feasibility of designs for quadrature thinning of two-dimensional conformal arrays, which exhibit the same or better beam patterns than conventional arrays and yet use only one-third of the transmit/receive modules.

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- Rapid Access, Small Cargo, Affordable Launch (RASCAL). ($12.000 Million)
  - Demonstrate aircraft propulsion adaptation to first-stage mission requirements.
  - Initiate Phase I: Conduct feasibility studies and concept definitions.
  - Perform reusable launch vehicle mass injection pre-compressor cooled risk reduction testing.
  - Design expandable rocket vehicle (ERV) avionics head stage.
  - Conduct ERV low cost feasibility studies/manufacturing demonstrations.
  - Establish system level design and feasibility of performance and cost goals.

- Water Rocket. ($4.845 Million)
  - Perform critical technology demonstrations and analysis of the system design for the regenerative fuel cell and other developmental components, including thrusters.

(U) FY 2003 Plans:

- Compact Lasers for Coherent Communication, Imaging and Targeting. ($10.000 Million)
  - Develop and demonstrate scalable designs for 1024x1024 spatial light modulator with integrated electronics.
  - Develop prototype system with high-speed parallel electronics.
  - Demonstrate horizontal slantpath communication links and aberration-free coherent imaging with ranges up to 10 kilometers.

- High Power Lasers. ($18.000 Million)
  - Demonstrate greater than 100-watt output power from large mode-field area fibers and coupling high brightness laser diode pumps.
  - Down select two designs of coherent combining of fiber lasers for one-kilowatt output power.
  - Model and design advantages of the ultra-short pulse regime for DoD applications.
  - Optimize intra-cavity grating design (geometry, placement, length, resolving power).
  - Demonstrate pulse widths of as short as ~ 0.1 psec using Thz gain pumping or pulse compression techniques.
  - Demonstrate 100 times power amplification of laser diode system as compared to state-of-the-art Fabry-Perot laser diodes (~ 100 kW/cm @10 psec).
  - Demonstrate very high power short pulse lasers using plasma pulse compression.

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- Develop high power lasers with liquid gain medium.

- Mission Specific Processing (MSP). ($12.000 Million)
  - Complete development of a wideband adaptive receiver system.
  - Demonstrate a ten-fold performance improvement in custom radar signal processing chips.
  - Begin integration of chips into a functional testbed.
  - Develop a test and demonstration plan for a fully functional adaptive radar processor.
  - Kernel library of key Digital Signal Processing functions and supporting tool augmentations complete.
  - Complete development of adaptive processor for seeker-receiver.
  - Complete design of innovative application specific integrated circuit (ASIC) architecture for Electronic Intelligence processor.
  - Transition MSP kernel library to ASIC fabrication vendors.
  - Conduct first pass evaluation of semi-custom, full scale chips.

- High Performance Algorithm Development/Virtual Electromagnetic Testrange. ($12.000 Million)
  - Demonstrate efficient, accurate predictive algorithms for electromagnetic scattering from inhomogeneous and anisotropic materials.
  - Demonstrate efficient scattering codes capable of accurate computation of Radar Cross Section for cruise-missile-sized vehicles with realistic material boundary conditions and full complexity components.
  - Demonstrate high fidelity computational electromagnetic modeling capability for multisensor apertures and arrays.
  - Demonstrate localized harmonic series representations of gravitational and other geospatial/navigational data that provide substantial accuracy and computational efficiency improvement over current schemes.
  - Determine tractable Bio Regulatory Network component subnetworks, manipulation techniques, measurement methodology, and data reduction approaches for cell-based simulation of analog circuits and control loops.
  - Determine feasibility of direct recognition of phonemes in analog to digitals for speech systems.
  - Determine optimal scheduling strategies for interleaving communication, electronic warfare and sensing on common multifunctional RF systems.
  - Develop reduced-order models and algorithms for sensing and control of biochemical materials growth processes.
  - Develop representations for low altitude gravity data with enhanced precision to support next-generation strike requirements and using ten percent of currently required storage.

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- Integrated Sensing and Processing. ($9.000 Million)
  - Develop and demonstrate spatio-spectral feature extraction and four-dimensional (three spatial, one spectral) reconstructions in passive interferometric sensors.
  - Demonstrate robust beamforming and adaptive array algorithms for quadrature-thinned two-dimensional conformal arrays exhibiting same or better cancellation of interference than conventional arrays with only one-third of the transmit/receive modules and with at least ten times the reduction in computational costs.
  - Demonstrate feasibility of contrast invariant geometry-based fusion of infrared video frames with digital terrain elevation data and feature data for applications to cruise missile mission planning.
  - Develop real-time waveform design and scheduling strategies for ambiguity reduction and clutter mitigation in pulse diversity radar systems.

- Coherent Combination of Solid State Lasers. ($4.000 Million)
  - Demonstrate use of spatial light modulator for coherent combination of many solid-state lasers.
  - Demonstrate use of higher order mode fiber laser (J=1).
  - Investigate coherent combining of J=1 fiber laser.

- Water Rocket. ($4.000 Million)
  - Complete detailed design and fabrication of brassboard and demonstration of the developmental components.

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

- 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-07					
COST *(In Millions)*	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost to Complete	Total Cost
Aeronautics Technology TT-07	27.432	23.635	37.000	22.845	27.737	29.653	29.590	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) Micro Adaptive Flow Control (MAFC) technologies enable control of large-scale aerodynamic flows using small-scale actuators. MAFC technologies combine adaptive control strategies, with 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 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) 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 10.0g 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. Engines may be explored at larger scale to prove feasibility. Examples of new mission capabilities may include delivery of very small (200 g) satellites to low earth orbit, extended range small-scale precision munitions, and lightweight, long endurance miniature reconnaissance vehicles. These small-scale munitions would complement emerging unmanned vehicle systems and greatly increase mission capabilities by simultaneously increasing loadout, range and precision.

(U) The Army, Navy and Marine Corps have a need for affordable, survivable, vertical take-off and landing (VTOL) air vehicles to support dispersed units in littoral and urban areas. The Advanced Air Vehicles (AAV) program explores innovative VTOL technologies and concepts with the potential for significant performance improvements that would satisfy stressing mission needs. One such concept is the advanced Canard Rotor/Wing (CRW) aircraft, that offers the potential for a high speed rapid response capability from a VTOL unmanned air vehicle with significant

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range and stealth improvements as compared to other VTOL concepts. Design and fabrication of this scaled vehicle concept will validate the command and control, stability and control system and aerodynamic performance required for vertical take-off, landing and hover via a rotating center wing that stops and locks in place for efficient high speed cruise.

(U) DARPA is continuing its investment in innovative, long endurance unmanned air vehicle (UAV) technology. The military application of such vehicles is the provision of reliable, tactically controlled intelligence, surveillance and reconnaissance (ISR) and communications equivalent to low earth orbit satellites. To achieve endurance on the order of two weeks, at operationally significant altitudes (60,000+ ft), with 250+ lb payloads it is necessary to develop airframes with very high strength and low structural weight. It is also necessary to develop high efficiency propulsion systems with sufficient peak power to provide station keeping in periodic high winds. Recent advances in high strength, all composite airframes, hydrogen fuel cell technology and high strength, composite, hydrogen dewars suggest that such a vehicle design is realizable.

(U) There is an increasing need for air lift capability to support quick response operations. To address this, the Unmanned Tilt-Rotor (UTR) program will exploit a new and revolutionary advance in tilt rotor aircraft, using the patented Optimum Speed Rotor (OSR) technology, demonstrated in the A160 Hummingbird UAV helicopter program. Scaling studies indicate that a very large tilt-rotor aircraft employing large diameter variable rpm OSR props/rotors for high efficiency hover and flight would achieve high transit speed (greater than 350 kts) and extremely long ranges. This technology will give rise to a VTOL cargo lifter capable of deploying directly from CONUS to combat and also have the capability for intra-theater transport of maneuver brigades. DARPA has determined that a rapid and cost-effective means to demonstrate the critical technologies in this vehicle is with a subscale UTR aircraft. The program will develop this advanced concept with a 8,500 lb UTR vehicle to optimize and demonstrate the OSR tilt-rotor technology.

(U) Program Accomplishments and Plans:

(U) FY 2001 Accomplishments:

- Micro Adaptive Flow Control (MAFC). ($15.757 Million)
  - Initiated fully implemented MAFC technology development and validation tests for scale model of V-22 lift enhancement, large scale wing model synthetic jet lift control, and delayed retreating blade stall.
  - Continued demonstration of high-speed compressor stage with aspiration flow control to give pressure rise of 3.4 across the stage.
  - Completed demonstration of biomorphic flapping flight.

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- Initiated the development of closed-loop MAFC technologies toward feasibility demonstrations.
- Initiated fully implemented MAFC technology development and validation tests for scale model of quad tilt rotor lift enhancement and drag reduction.
- Completed design of a supersonic inlet for mesoflap testing.

- Small Scale Propulsion Systems (SSPS). ($8.036 Million)
  - Completed detailed design for propulsion systems.
  - Completed critical subsystem fabrication and testing.
  - Began fabrication of full propulsion systems.

- Advanced Air Vehicles: Canard Rotor/Wing (CRW). ($1.794 Million)
  - Continued demonstrator fabrication.
  - Conducted hardware in the loop and ground testing.

- Advanced Aeronautic Concepts. ($1.845 Million)
  - Continued technology assessments and feasibility testing of advanced aeronautic concepts, including coordinated unmanned multi-ship complex aerobatic flying, single aircraft composed of multiple air vehicles, and application of natural flight mechanics to robotic systems.

(U) FY 2002 Plans:

- Micro Adaptive Flow Control (MAFC). ($9.373 Million)
  - Assess actuator and control system performance, control authority, bandwidth and power requirements.
  - Complete MAFC feasibility demonstrations for selected military applications, including scale model of V-22 lift enhancement, high speed inlet mesoflaps, large scale wing model synthetic jet lift control and delayed retreating blade stall.
  - Initiate studies to integrate MAFC technologies into full-scale engine and aircraft systems. Initiate demonstration plan, including flight and field tests of integrated MAFC systems.

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- Small Scale Propulsion Systems (SSPS). ($7.365 Million)
  - Complete initial fabrication and testing of propulsion systems.

- Advanced Air Vehicles: Canard Rotor/Wing (CRW). ($2.047 Million)
  - Complete ground testing and initiate demonstrator flight tests.

- Long Endurance Hydrogen Powered Unmanned Air Vehicles. ($4.850 Million)
  - Conduct design trades and critical item demonstrations on structural and propulsion concepts.
  - Prepare preliminary design of 14 day, 250+ lb payload, 60,000 ft cruise UAV.

(U) **FY 2003 Plans:**

- Micro Adaptive Flow Control (MAFC). ($8.540 Million)
  - Continue closed-loop MAFC actuator and controller development.
  - Continue application of closed-loop MAFC under full-scale system conditions for hydrodynamic drag reduction, 40-mm grenade flight control, integrated inlet and compressor flow control, stator vane flow control and short take-off and vertical landing exhaust acoustic control.
  - Continue flight and field tests of integrated MAFC systems including V-22 lift enhancement, large-scale wing model synthetic jet lift control, and Quad Tilt Rotor lift enhancement and drag reduction.

- Small Scale Propulsion Systems (SSPS). ($7.200 Million)
  - Complete final fabrication and testing of propulsion systems.

- Advanced Air Vehicles: Canard Rotor/Wing (CRW). ($1.760 Million)
  - Complete demonstrator flight tests and produce final report.

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- Long Endurance Hydrogen Powered Unmanned Air Vehicle. ($12.000 Million)
  - Continue testing of critical items and subsystems related to structure, propulsion, flight control and payload.
  - Complete conceptual design of aircraft.

- Unmanned Tilt Rotor (UTR). ($7.500 Million)
  - Initiate preliminary design with focus on prop rotor, wing, tail and power train subsystems.
  - Perform risk reduction experiments and concept development analysis and simulation.

(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 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost to Complete	Total Cost
Advanced Logistics Technology TT-10	26.791	22.529	22.000	24.814	9.906	0.000	0.000	0.000	N/A

(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 (ALP) that developed the core functional technologies and the UltraLog Program that will make the logistics information system inherently survivable even in the most hostile environments. Technology focus includes enhancing the robustness, stability and security of the core data and information processing, thus creating a resilient system that can protect and adapt itself under harsh, dynamic conditions.

(U) The Advanced Logistics Program (ALP) investigated and demonstrated technologies that will make a fundamental difference in transportation and logistics. The program defined, developed and demonstrated 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 is extremely labor intensive, inefficient, and time consuming. ALP leveraged information technologies to address these shortcomings. ALP focused 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 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 were integrated and demonstrated in a prototype end-to-end system solution. This program came to completion in FY 2001.

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(U) The UltraLog program builds on the baseline security, robustness and scalability capabilities of the technology developed in the Advanced Logistics Program. UltraLog will 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. Using the infrastructure developed by the ALP, UltraLog will pursue research breakthroughs in four main areas: (1) Security: Investigate information pedigree, white-noise generation, dynamic random routing, agent gateways, dynamic Public Key Infrastructure 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, 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, and other techniques to achieve a state of high survivability; 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.

(U) Program Accomplishments and Plans:

(U) FY 2001 Accomplishments:

- Advanced Logistics Program (ALP). ($9.855 Million)
  - Developed the capability to automatically build a logistics plan in under one hour in support of a complex operational scenario, and to rapidly modify that plan to keep it accurate and relevant under changing circumstances.
  - Developed the capability to monitor resource information, availability, capacity and costs, and to view past, present and projected logistical situations.
  - Developed and demonstrated the ability of the ALP technology to operate on embedded devices in a mixed human/robotics environment.
  - Developed plans for conducting follow-on pilot tests.

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- UltraLog. ($16.936 Million)
  - Established the developmental and experimental environments, and the metrics and methods by which the initial experimentation will be evaluated.
  - Designed, developed and evaluated a variety of independent technologies for security, scalability and robustness that demonstrate the potential for extending and enhancing large-scale, distributed agent systems, with special attention to experimentally proving the feasibility of each technique based on a set of technical and functional requirements.
  - Performed systemic analysis of combinations and layering of developed technologies for overall effectiveness under varying experimental and environmental conditions.

(U) FY 2002 Plans:

- UltraLog. ($22.529 Million)
  - Develop, integrate and evaluate a synergistic collection of technologies providing dynamic information security and agent system survivability for sustained wartime logistics operations in a moderate information warfare environment.
  - Establish an instrumented and configurable test environment, which includes the ability to generate infrastructure and communications failures, chaotic requirement flows and selected security breaches.
  - Conduct review by external, independent evaluation teams of both the concept of operations and technical designs of the various system components to identify deficiencies and recommend improvements. Incorporate recommendations and mitigating approaches to ongoing development effort.

(U) FY 2003 Plans:

- UltraLog. ($22.000 Million)
  - Develop, integrate and evaluate a refined portfolio of technologies, integrated and layered, to provide effective security, scalability and robustness under a moderately chaotic wartime and information warfare environment.
  - Conduct further reviews by external, independent evaluation teams of both the concept of operations and technical designs of the various system components to identify deficiencies and recommend improvements. Incorporate recommendations and mitigating approaches to ongoing development effort.
  - Migrate maturing concepts and technologies to transition agencies and services using program developed agent technologies.

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– Use the test environment to demonstrate the survivability of the evaluation system under harsh, chaotic conditions similar to that of a major regional contingency supported by directed adversary information warfare attack.

(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 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost to Complete	Total Cost
Joint Logistics ACTDs TT-11	9.570	9.587	0.000	0.000	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 . The initial Joint Logistics ACTD addressed Commander-in-Chief 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 follow-on ACTD, the Joint Theater Logistics ACTD (JTL ACTD) integrates and expands upon 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 tools developed in the original ACTD and to emphasize the focus upon forces associated with a Joint Task Force in a theater of operations. These tools will 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. 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 assessment to logistics commanders. JTL capabilities will include real-time interoperability between logistics and operations during all phases of planning and execution. Key data sources include Conventional Forces Database, Joint Total Asset Visibility, Joint Personnel Asset Visibility, the Global Transportation Network, the Joint Operational Planning and Execution System, and the Global Status of Readiness and Training System. This project concludes in FY 2002.

(U) Program Accomplishments and Plans:

(U) FY 2001 Accomplishments:

- Joint Logistics ACTD. ($0.867 Million)
  - Transitioned Joint Decision Support Tools (JDST) capability into the Global Combat Support System.

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- Joint Theater Logistics (JTL) ACTD. ($8.703 Million)
  - Expanded 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. Tracked the execution of fuel sourcing and sustainment.
  - Incorporated and enhanced planned deviation detection technology and sentinels to display near real-time operational logistic activity for selected support items by location, provider and intended consumer.
  - Developed capability to rapidly assess the impact of operational changes upon the logistic support structure.
  - Developed a real-time in-theater management capability for critical fuel support that integrates execution of logistic support plans with logistics and operational data feeds.
  - Began to develop the capability to forecast the impact of deviations and alternative support concepts upon future operations.
  - Demonstrated multi-echelon collaboration of in-theater management capabilities in a joint warfighting exercise.
  - Began transition planning and discussions with GCSS personnel.

(U) FY 2002 Plans:

- Joint Theater Logistics (JTL) ACTD. ($9.587 Million)
  - Incorporate and enhance planned deviation detection technology and sentinels to compare planned resource requirements with near real-time operational logistic activity for selected support items by location, provider, and intended consumer.
  - Provide the warfighter with near real-time operations and logistic collaborative capabilities to support planning and execution.
  - Incorporate technologies that will track planned versus actual movements, and assess logistic readiness, selected weapons systems, and classes of supply.
  - Develop and demonstrate a watchboard capability to track and report operational and logistics status of current operations through a web-based framework.
  - Provide interactive models for requirements, availability and costs.
  - Integrate watchboard and common operational picture views to provide logistic overlays for the warfighter.
  - Demonstrate multi-echelon interoperability and in-theater management capabilities in a joint warfighting exercise.
  - Continue transition planning for incorporation of JTL ACTD products.

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(U) FY 2003 Plans:

- Not Applicable.

(U) Other Program Funding Summary Cost:

- Not Applicable.

(U) Schedule Profile :

- Not Applicable.