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BMDO RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)	DATE February 2000
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BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602173C Support Tech - Applied Research
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COST (<i>In Thousands</i>)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	93466	88365	37747	13839	14177	55754	51160	TBD	TBD
1180 Surveillance Technology	310	3994	0	0	0	0	0	TBD	TBD
1280 Interceptor Technology	955	0	0	0	0	0	0	TBD	TBD
1461 BMC4I	6758	11164	0	0	0	0	0	TBD	TBD
1651 Innovative Science and Technology (IST)	22843	17475	7862	8832	9186	13746	14714	Continuing	Continuing
1660 Statutory and Mandated Programs	62600	55732	29885	5007	4991	42008	36446	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element includes in project 1651 the only applied research project in the Department of Defense, which focuses specifically on future BMDO technical requirements.

To prepare to meet critical future active defense needs, the Innovative Science and Technology (IS&T) project invests in an aggressive program of high leverage technologies that yield markedly improved capabilities across a selected range of boost phase methods and terminal defense interceptors, advanced target sensors, and innovative science. Program investments are to provide 1) component technologies that offer improved performance or reduced costs for BMDO acquisition programs, 2) better understanding of the material characteristics and physics for processes that form the basis of technologies, and 3) technical solution options to mitigate far-term and unpredicted threats. Unlike other BMDO projects that fund near term technology and testing efforts, this advanced technology initiative invests seed money in high-risk technologies that could significantly change how BMDO develops future systems. Specific technology areas of interest include 1) sensing, imaging, ranging, and discrimination, 2) phenomenology studies, 3) electronic and photonic materials and devices, 4) information processing and computing technologies, 5) directed energy, non-linear optical devices and processes, 6) agility and kill enhancement, and 7) power generation and conditioning. This project conducts proof-of-concept research and matures novel technologies for transition to advanced development. IS&T programs more closely aligned with existing BMDO Surveillance, Interceptor, and BMC4I technology efforts are managed under these programs respectively.

Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs are managed under project 1660. Pursuant to PL 102-564, a two-phased competition for small businesses with innovative technologies is conducted, focusing on relevant BMDO technologies with an emphasis on technologies with commercial application potential.

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<p>The program objective of the Technology Applications (TA) Program, established in 1986, is to develop and support the transfer of BMD derived technology to other Department of Defense agencies as well as other federal, state, and local government institutions, laboratories, universities, and industry. Incorporation of these by the private sector and other government agencies can result in reduced unit costs and further improvements to be made available for future applications in BMDO systems.</p> <p>The Historically Black Colleges and Universities/Minority Institutions (HBCU/MI) program is also managed in project 1660 under this program element. The HBCU/MI Program increases and improves the participation of minority colleges and institutions in the BMDO program. It also responds to Section 832 of Public Law (PL) 101-510, which establishes a specific goal for HBCUs and MIs within the overall five percent goal for minority research grants, and introduces them to BMDO technologies and the particulars of the BMDO procurement process.</p> <p>Many of today's baseline technologies on BMDO systems like Theater High Altitude Area Defense (THAAD), Patriot Advanced Capability (PAC3), and Ground Based Radar (GBR) are viable due to the wise investment in innovative technologies some 10 or more years ago. Examples include: indium antimonide and mercury cadmium telluride ultra-sensitive infrared detectors; 32-bit radiation hardened Reduced Instruction Set Computer (RISC) processors for image analysis; composite materials for lightweight satellite structures; interferometric fiber-optic gyroscopes for miniaturized guidance and control systems; and solid-state gallium arsenide transmitter/receivers for advanced BMDO radars.</p> <p><u>Acquisition Strategy</u>: The IS&T R&D program solicits proposals by an annual Broad Agency Announcement (BAA) of research opportunities. Proposals received are competitively judged according to BMD innovation, relevance, cost, and capabilities of the offeror. The HBCU/MI program also receives proposals in response to a biannual BAA. For the SBIR and STTR programs, strong emphasis is placed on the commercial nature of the proposed effort. BMDO conducts an annual SBIR/STTR solicitation and competition, and the executing agents award and manage the contracts. BMDO employs government executing agents, called Science and Technology Agents (STAs) from the three services and NASA, with each STA responsible for a specific technical area. The STA's are the appropriate points of contact to, and for, the research community.</p>		
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<p>FY 1999 Accomplishments:</p> <ul style="list-style-type: none"> • 22843 IS&T (1651) Two key technologies developed by the IS&T program were transitioned to flight demonstration in joint agency programs in FY99. First, Hall thruster technology was launched and demonstrated in a joint BMDO/Navy/NASA/NRO program and Solar Concentrator Arrays with Refractive Linear Element Technology (SCARLET) initiated in IS&T flew on NASA's Deep Space 1 probe. These technologies can greatly reduce required spacecraft mass in BMDO-related missions such as SBIRS-low (estimated savings in applications of this class are \$5M/spacecraft). The Dual Mode Experiment on Bowshock Interactions (DEBI) completed CDR and is on schedule for flight in FY00. Continued development of imaging technologies for extremely bright background scenarios provided direct coverage of various National missions including, for example, NASA's Cassini probe (launch critical), Navy TMT-2 and TTV-1, and THAAD. Continued development of several innovative sensing technologies including a computer tomography imaging spectrometer, and multiwavelength devices. Transferred new ASIC technology for massively paralleled miniature, autonomous tracking and recognition systems. Developed and demonstrated a shoe box size, gray scale optical correlator for on-board ATR. Continued development of active sensors, ranging LADAR, and algorithms for sensor data fusion. Demonstrated six degree of freedom platform stabilization to milliradian tolerances. Initiated research on antenna-coupled bolometers for very innovative LWIR sensors and polarimetry. Initiated research on new guidance and control algorithms for advanced, high performance interceptors. Completed investment in electric propulsion technology – transfer to NASA for flight demonstration. Demonstrated key new propulsion technologies and developed simulations and system requirements for miniature interceptor systems. • 1270 Tech Apps. (1660): TA Database: Maintained up-to-date information on potential BMD programs that have commercial applications. Updated graphics and interactive modes into national information infrastructure on BMD-sponsored technologies. Panel Reviews: Provided assistance to large, medium and small businesses wishing to bring BMD-supported technology to the commercial market. Outreach: Developed assistance publications, brochures and target articles for journals and newspapers, quarterly newsletters, conference exhibits, and advertisements in reports on BMDO technology. Networking: Expanded results of technology transfer by working with other Federal technology transfer organizations and activities such as the OSD Director DDR&E Office of Technology Transition, NASA, and DOE. Interacted with professional/technical associations and societies involved with technology transfer. • 57101 SBIR/STTR (1660): 183 Phase I SBIR Awards to 150 firms and 70 Phase II SBIR awards to 60 firms. • 1349 HBCU/MI (1660): Will incrementally fund an estimated 10 contracts in the areas of electronics, sensors, materials, and BMC3. • 2880 Civilian Salaries for Executing Agents (EAs). • 8023 Demonstration projects for fault tolerant computing, high rate data processing, satellite to ground laser communications, Gallium Nitride (GaN) power amplifiers, innovative sensor fusion algorithms and processors, and miniature interceptor technologies formerly executed under Project 1651 executed under Projects 1180, 1280, and 1461 in FY1999. <p>Total 93466</p>		
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<p>FY 2000 Planned Program:</p> <ul style="list-style-type: none"> • 17475 IS&T (1651) As funding permits, continue innovative applied research tasks. Fly the Dual Mode Experiment on Bowshock interactions and compare results to existing phenomenology model. Continue plume phenomenology investigations for discrimination, typing, and hardbody handover. Continue development of innovative sensor technology including the computer tomographic spectrometer, antenna-coupled bolometers, and multiwavelength imagers. Develop ultrafast switches and wavelength multiplexed transmitters for advanced communications systems. Continue development of advanced algorithms for guidance and control. Continue development of advanced neural networks and other technologies for on-board autonomous navigation and control. Initiate innovative ultra wide band radar development effort. Continue development of advanced miniature interceptor technology, propellant technology, and kill enhancement technologies. Continue development of active sensing technology and phenomenology for hypersonic interceptors. Continue to provide testbed for advanced sensor demonstrations and to provide coverage for national missions. • 952 Tech Apps. (1660): TA Database: Maintain up-to-date information on potential BMD programs that have commercial applications. Update graphics and interactive modes into national information infrastructure on BMD sponsored technologies. Panel Reviews: Provide assistance to large, medium, and small businesses wishing to bring BMD supported technology to the commercial market. Outreach: Develop assistance publications, brochures and target articles for journals and newspapers, quarterly newsletters, conference exhibits, and advertisements in reports on BMDO technology. Networking: Expand results of technology transfer by working with other Federal technology transfer organizations and activities such as the OSD Director DDR&E Office of Technology Transition, NASA and DOE. Interact with professional/technical associations and societies involved with technology transfer and commercialization. • 48419 SBIR/STTR (1660) : Estimated 195 Phase 1 SBIR Awards to 160 firms and 75 Phase II SBIR awards to 70 firms • 1244 HBCU/MI (1660): Will incrementally fund an estimated 10 contracts in the areas of electronics, sensors, materials, and BMC3. • 5117 Civilian Salaries for EAs 15158 Continue development of multi-spectral image sensors to enhance capabilities for detection of ballistic and cruise missiles. Continue development of laser communications system technology and testing of high bandwidth optical communications between multiple platforms. Conduct high frequency (HF) radar research. <p>Total 88365</p>		
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- FY 2001 Planned Program:**
- 7862 IS&T (1651): As funding permits, continue to investigate critical technologies in the seven key areas noted above subject to progress in the technical areas.
 - 994 Tech Apps. (1660): TA Database: Maintain up-to-date information on potential BMD programs that have commercial applications. Update graphics and interactive modes into national information infrastructure on BMD sponsored technologies. Panel Reviews: Provide assistance to large, medium, and small businesses wishing to bring BMD supported technology to the commercial market. Outreach: Develop assistance publications, brochures and target articles for journals and newspapers, quarterly newsletters, conference exhibits, and advertisements in reports on BMDO technology. Networking: Expand results of technology transfer by working with other Federal technology transfer organizations and activities such as the OSD Director DDR&E Office of Technology Transition, NASA and DOE. Interact with professional/technical associations and societies involved with technology transfer and commercialization.
 - 24767 SBIR/STTR (1660): Estimated 175 Phase 1 SBIR Awards to 145 firms and 70 Phase II SBIR awards to 65 firms
 - 1294 HBCU/MI (1660): Will incrementally fund an estimated 10 contracts in the areas of electronics, sensors, materials, and BMC3.
 - 2830 Civilian Salaries for EAs
- Total 37747

<u>B. Program Change Summary</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Previous President's Budget (<u>FY 2000 PB</u>)	0	97436	65328	52992
Congressional Adjustments			24000	
Appropriated Value			89328	
Adjustments to Appropriated Value				
a. Congressional General Reductions			-959	
b. SBIR / STTR				
c. Omnibus or Other Above Threshold Reductions				
d. Below Threshold Reprogramming			-4	
e. Rescissions				
Adjustments to Budget Years Since <u>FY 2000 PB</u>	0	-3970		-15245
Current Budget Submit (<u>FY 2001 PB</u>)	0	93466	88365	37747

Change Summary Explanation:

Significant changes due to funding of SBIR in FY00 and elimination of FY01-05 SBIR funding to implement OSD Program Budget Decision.

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