# ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

**February 2006**

| BUDGET ACTIVITY | PE NUMBER AND TITLE |
|---|---|
| **6 - Management support** | **0605602A - Army Technical Test Instrumentation and Targets** |

| | COST (In Thousands) | FY 2005 Estimate | FY 2006 Estimate | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | FY 2010 Estimate | FY 2011 Estimate |
|---|---|---|---|---|---|---|---|---|
| | Total Program Element (PE) Cost | 71804 | 68299 | 74066 | 75267 | 75308 | 74392 | 58878 |
| 628 | Developmental Test Technology & Sustainment | 58120 | 45736 | 47060 | 47711 | 47976 | 45973 | 36569 |
| 62B | OPERATIONAL TESTING INSTRUMENTATION DEVELOPMENT | 7887 | 15398 | 12723 | 13047 | 13150 | 13681 | 11022 |
| 62C | MODELING AND SIMULATION INSTRUMENTATION | 5797 | 7165 | 14283 | 14509 | 14182 | 14738 | 11287 |

**A. Mission Description and Budget Item Justification:** Increased funding beginning in FY 2007 provides sustainment and improvements to the Army's test infrastructure reflecting an Army leadership decision supporting Congressional and Office of Secretary of Defense interest in implementing the Defense Science Board (DSB) recommendations to increase developmental test funding. The DSB report indicated that testing is not being adequately conducted, resulting in latent defects that can be very costly and impact system's operational effectiveness and that the acquisition process is not delivering high quality, reliable and effective equipment to our military forces. Limited T&E instrumentation investments are a major contributor to the lack of testing and the problems described in the DSB report.

This Program Element provides critical front-end investments for development of new test methodologies, test standards, advanced test technology concepts for long range requirements, future test capabilities, and advanced instrumentation prototypes for the United States Army Developmental Test Command (DTC), which includes: Aberdeen Test Center (ATC), Aberdeen Proving Ground, Maryland; White Sands Missile Range (WSMR), New Mexico Electronic Proving Ground (EPG), Fort Huachuca, Arizona; Yuma Proving Ground (YPG), Arizona (including the Cold Regions Test Center (CRTC), Fort Greely, Alaska and the Tropical Regions Test Center, Hawaii); Aviation Technical Test Center (ATTC), Fort Rucker, Alabama; Redstone Technical Test Center (RTTC), Redstone Arsenal, Alabama; and Dugway Proving Ground (DPG), Utah. These capabilities support the development and fielding cycle of the Army Transformation as well as Joint Vision 2020 initiatives. Within this program, a major initiative called Virtual Proving Ground (VPG) is directed towards integrating Modeling, Simulation, and Internetting technologies into the test and evaluation process to support acquisition streamlining and to offset prior manpower and budget reductions. The Virtual Proving Ground will significantly improve the ability of the Army to provide early influence on system design, reduce test costs and time, and extend the envelope of information to reduce risk and acquisition costs. This initiative is critical to achieving long-term efficiencies within the acquisition process by conforming to the Simulation and Modeling for Acquisition, Requirements, and Training (SMART) and Simulation Based Acquisition (SBA) processes. Sustaining instrumentation maintains existing testing capabilities at DTC test facilities by replacing unreliable, uneconomical and irreparable instrumentation, as well as incremental upgrades of instrumentation and software, to assure adequate test data collection capabilities. This data supports acquisition milestone decisions for all commodity areas throughout the Army including programs such as Stryker Armored Vehicle (SAV), Future Combat Systems (FCS), Theater High Altitude Area Defense (THAAD), Patriot Advanced Capability Phase 3 (PAC 3), High Mobility Artillery Rocket System (HIMARS), M1A2 Main Battle Tank, Joint Service Lightweight Integrated Suit Technology (JSLIST), Javelin Missile System, Family of Medium Tactical Vehicles, Army Battle Command System (ABCS), Force XXI Battle Command Brigade and Below (FBCB2) and Land Warrior. This Program Element develops and sustains developmental test capabilities that provide key support to the Army's Transformation. This Program Element also includes funding for modeling and simulation efforts as well as support for development and sustainment of operational test assets at Airborne Special Operations Test Directorate, Fort Bragg, North Carolina; Air Defense Artillery Test Directorate, Fort Bliss, Texas; Fire Support Test Directorate, Fort Sill, Oklahoma; Intelligence Electronic Warfare Test Directorate, Fort Huachuca, Arizona; and Test and Evaluation Support Agency, Fort Hood, Texas. The development and sustainment of Army Test and Evaluation Command's Simulation Testing Operations Rehearsal Model (STORM) is also included. Systems that will benefit from this effort are Army Tactical Command and Control System (ATCCS), Battlefield Functional Area (BFA), Advanced Field Artillery Tactical Data System (AFATDS), Maneuver Control System (MCS), Forward Area Air Defense

Command Control and Intelligence (FAADC2I), All Source Analysis System (ASAS), and Combat Service Support Control System (CSSCS).

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| **B. Program Change Summary** | FY 2005 | FY 2006 | FY 2007 |
|---|---|---|---|
| Previous President's Budget (FY 2006) | 60142 | 62687 | 82385 |
| Current BES/President's Budget (FY 2007) | 71804 | 68299 | 74066 |
| Total Adjustments | 11662 | 5612 | -8319 |
| Congressional Program Reductions | | -300 | |
| Congressional Rescissions | | -688 | |
| Congressional Increases | | 6600 | |
| Reprogrammings | 11662 | | |
| SBIR/STTR Transfer | | | |
| Adjustments to Budget Years | | | -8319 |

Change Summary Explanation:
In FY05 $4.7 million reprogrammed for the Joint Experimentation Range Complex (JERC) in support of the Global War on Terrorism. $6.9 million reprogrammed for test instrumentation improvements at White Sands Missile Range, New Mexico; Redstone Technical Test Center, Alabama; Dugway Proving Grounds, Utah; Aberdeen Test Center, Maryland and Yuma Proving Ground, Arizona. In FY07 $8.3 million realigned to higher priority requirements.

# ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

**February 2006**

| BUDGET ACTIVITY | PE NUMBER AND TITLE | PROJECT |
|---|---|---|
| **6 - Management support** | **0605602A - Army Technical Test Instrumentation and Targets** | **628** |

| COST (In Thousands) | | FY 2005 Estimate | FY 2006 Estimate | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | FY 2010 Estimate | FY 2011 Estimate |
|---|---|---|---|---|---|---|---|---|
| 628 | Developmental Test Technology & Sustainment | 58120 | 45736 | 47060 | 47711 | 47976 | 45973 | 36569 |

**A. Mission Description and Budget Item Justification:** This program provides critical front-end investments for development of new test methodologies, test standards, advanced test technology concepts for long range requirements, future test capabilities, and advanced instrumentation prototypes for the United States Army Developmental Test Command (DTC), a subordinate command of the Army Test and Evaluation Command (ATEC), which includes: Aberdeen Test Center (ATC), Aberdeen Proving Ground, Maryland; White Sands Missile Range (WSMR), New Mexico; Electronic Proving Ground (EPG), Fort Huachuca, Arizona; Yuma Proving Ground (YPG), Arizona (including the Cold Regions Test Center (CRTC), Fort Greely, Alaska and the Tropic Regions Test Center, at various locations); Aviation Technical Test Center (ATTC), Fort Rucker, Alabama; Redstone Technical Test Center (RTTC), Redstone Arsenal, Alabama; and Dugway Proving Ground (DPG), Utah. These capabilities are required to support developmental testing requirements of current Army systems and those systems supporting Army Transformation.

Within this program, the highest priority technology investment is building the Army's network-centric test capability. This capability, comprised of modern simulation and internetting technologies, uses the Department of Defense Architecture Framework to integrate live, virtual and constructive models in realistic live and synthetic environments. A network of Distributed Test Control Centers (DTCCs), each connected to the Defense Research and Engineering Network (DREN), has been installed at each Army test range to bring all of the Army's test capabilities to bear on the complex challenge of system-of-systems testing. Within the DTCC network, an Inter-Range Control Center (IRCC), installed at White Sands Missile Range (WSMR), serves as the primary interface between ATEC test ranges and the Future Combat Systems Lead Systems Integrator System-of-Systems Integration Laboratory (SOSIL). The IRCC will facilitate a complete virtual replication of the battlespace using distributed test assets to exercise, measure and analyze the synergies achieved through the system-of-systems architecture. It will serve as the central test control for distributed tests involving multiple ranges and the SOSIL, and will provide the central analytic data center for comparing tactical common operational pictures with ground truth. This technology investment follows Office of Secretary of Defense guidance for Test and Evaluation test architectures and test and training range interoperability.

Sustaining instrumentation maintains existing capabilities at test facilities by replacing unreliable, uneconomical and irreparable instrumentation, as well as incremental upgrades of instrumentation and software, to assure adequate test data collection capabilities. This project develops and sustains developmental test instrumentation and capabilities that provide the data necessary to support acquisition milestone decisions for all commodity areas throughout the Army and in direct support of all Army Transformation Elements.

| **Accomplishments/Planned Program** | FY 2005 | FY 2006 | FY 2007 |
|---|---|---|---|
| Support of simulation and distributed testing: provide the necessary synthetic test environments, hardware-in-the-loop capabilities and models and simulations to successfully develop and test the Army Future Force. This will continue development of test control simulation tools and test beds which integrate actual field instrumentation data with existing simulations and models to conduct test range management, test setup, simulation model validation and test result validation. Synthetic Environment Integration projects are used to develop and demonstrate the ability to tie all geographically dispersed Army Test ranges and synthetic battle-space representations together for system of systems level testing. The Future Combat System (FCS) Lead Systems Integrator and the Program Manager (PM), FCS (BCT) Future Combat System Brigade Combat Team, have built this distributed test capability into their testing strategy . These projects also fund a collaborative knowledge management system to provide a common access for all data/documents within the Army test | 16853 | 16000 | 12264 |

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| community. It continues development of a High Level Architecture (HLA) and Department of Defense Test and Training Enabling Architecture (TENA) compliant architecture for integrating internal and external models, software algorithms, virtual test tools, databases, and synthetic environments; integrate synthetic range and image generation, and begin acquisition of test support tools. Continue development of tools for control and conduct of live, virtual and constructive integrated tests in net-centric warfare environments. | | | |
| Development, Acquisition and Sustainment of Critical Test Instrumentation: provide and maintain the necessary test instrumentation, computer and communications systems and other test facilities to successfully develop and test the Army Transformation and the Future Force. Acquire instrumentation for reliability, availability and maintainability data collection on vehicles, replace automotive transducers for measuring vibration and engine performance. Replace ballistic transducers for measuring chamber pressures during ammunition tests. Support development of common instrumentation for developmental and operational testing within all test commodity areas. Acquire instrumentation for electromagnetic environment effects on ground systems and air vehicles. Continue to replace range control instrumentation and upgrade and replace radar, optics and telemetry equipment. Acquire aircraft data recorders, signal conditioning equipment, data processing equipment and other instrumentation for aircraft and Unmanned Aerial Systems (UAS) tests. Updating the Weibel ballistic radars for artillery testing. Continue development/acquisition of: an optical data measurement system, radar transponders, mobile video instrumentation and control equipment used for tracking and capturing event data on aircraft and missiles. Continue to update survivability test capabilities in support of live fire and active protection systems. Improve vibration equipment for munitions tests. Improving mobile communications equipment and digital end devices for all test commodity area. Continue to develop Test Operation Procedures (TOPs) to ensure quality and consistent test results throughout the Army. | 21018 | 23877 | 29347 |
| Conduct strategic planning, and develop roadmaps to guide current and future programs. Provide command-level oversight and management support for the DTC instrumentation program. Technical support includes requirements development, project prioritization, and execution of investments accounts for Small Business Innovation Research, Production Base Support, Army Test Technology and Sustaining Instrumentation, Major Test and Evaluation (T&E) Investment, and the Central T&E Investment Program. Provide management and support costs for direct interface with the T&E Executive Agent, management of needs and solutions calls for T&E Reliance oversight, and support of the Army principal of the Test Resource Advisory Group (TRAG). | 5702 | 5859 | 5449 |
| Chemical Biological Defense Materiel Test and Evaluation Initiative (CBDMTEI) was a congressional addition to Defense Planning Guidance for the creation of a Technology Development, Application and Commercialization Center to promote licensing of inventions and submission of research proposals. It will also showcase DPG technology to business and education institutions, and sponsor activities to showcase capabilities of small business and educational institutions of interest to DPG. | 961 | 0 | 0 |
| Congressional add for WSMR modernization ($4.083 million), Film Eliminator ($3.362 million), and Advanced Digital Radar ($1.441 million). The WSMR Test Modernization project supports optical tracking systems by acquiring high-speed, medium-resolution digital imagers and required support equipment; digital photographic support equipment; facility networking equipment; and digital camera data downloading systems; upgrades to digital image processing and optical data analysis computers; high-bandwidth network equipment; a 50TerraByte disk library; and medium-resolution test camera and support equipment for testing, calibration and maintenance. The WSMR Film Elimination project supports non-tracking instruments by acquiring mobile launch support network vans; lenses, portable field computers, field storage devices, media duplicators; and equipment for digital imaging, reproduction, archiving and photo lab support in the Media Transfer Facility. The Advanced Digital Range Radar is a network-centric radar suite that will provide for future missile tracking requirements, while simultaneously reducing the costs of operation. The radar suite will consist of single-object trackers, multiple-object trackers, Imaging Systems, Doppler radars, and multistatic radar receivers - all of which are highly reliable and transportable. The radar suite will be configured as a single system, operating from single control points and remotely controlling the individual radar sensors without the need of onsite personnel. The system will provide needed measurement capabilities and will be able | 8886 | 0 | 0 |
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|---|---|---|---|
| to perform at very high and very low altitudes. | | | |
| Phase 1: National Counter Terrorism Counter-Insurgency Test & Evaluation Center. The Joint Experimentation Range Complex (JERC) was developed to provide test and training capabilities geared towards technical and operational characterization of systems and technologies required to support ongoing war efforts. Specifically, it provides urban/rural terrain sites, replicating the current operational theater. Originally built in 28-days, the site was anticipated to only be needed for a short time. There is now a clear need for a range for the long-term for Improvised Explosive Devices (IED) efforts and to expand its use to general counter-terrorism missions. To more effectively, reliably and rapidly test technologies and systems proposed to detect, defeat, and neutralize IEDs, the following projects provide crucial capabilities during the first phase of a 2-year multi-phase program: Threat System Auto Command and Control, European Global System for Mobile Communications (GSM) Cell Phone System Upgrades, Soldier Tracking System, Expanded Electronic Proving Ground (EPG) Electro-magnetic Environment (EME) Capability, Radio Frequency (RF) Monitoring Stations, Instrumentation Lab, Expand Global Positioning System (GPS) Coverage, Electronic System Lab, Real-time Command and Control Center, Expanded Network Coverage, and Terrain & Feature Modeling. | 4700 | 0 | 0 |
| Total | 58120 | 45736 | 47060 |

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**February 2006**

| BUDGET ACTIVITY | PE NUMBER AND TITLE | PROJECT |
|---|---|---|
| **6 - Management support** | **0605602A - Army Technical Test Instrumentation and Targets** | **62B** |

| COST (In Thousands) | | FY 2005 Estimate | FY 2006 Estimate | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | FY 2010 Estimate | FY 2011 Estimate |
|---|---|---|---|---|---|---|---|---|
| 62B | OPERATIONAL TESTING INSTRUMENTATION DEVELOPMENT | 7887 | 15398 | 12723 | 13047 | 13150 | 13681 | 11022 |

**A. Mission Description and Budget Item Justification:** This project provides for the technical development, enhancement, upgrade and maintenance of essential non-major instrumentation related technology programs. The various projects will achieve cost effective data collection, data reduction, data analysis, telemetry, and processing capability in support of robust and credible operational tests as required by the Department of Defense (DOD) and Congress. The increased sophistication of the Army's new weapons as well as communication and control systems demands new instrumentation's ability to capture test data non-intrusively. The data must be collected at high rates and in massive volumes. After the essential data is collected, it must be reduced to the essential elements necessary for effective evaluation. As the Army's digitization and transformation of the battlefield continues, this development effort allows Army Test and Evaluation Command's Operational Test Command (OTC) to modernize and develop its non-major instrumentation to be more robust, reliable and less intrusive in terms of integrating automated instrumentation during operational tests. The goal is to expand data collection, reduction, and analysis of the collected data and test control capability, while reducing future operational test costs. This project supports multiple instrumentation development efforts leading to improved command and control, increased mobility, expanded remote data collection from various tactical sites. In many instances instrumentation must have a transmission capability to central receiving, control, and evaluation stations at various test directorates, and the capability to support Real-Time Casualty Assessments which measures simulated attrition of forces during simulated battlefield engagements. OTC's test directorates are located at Fort Hood, TX, Fort Bragg, NC, Fort Bliss, TX, Fort Huachuca, AZ, and Fort Sill, OK. These programs support Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), and the Current to Future transition path of the Transformation Campaign Plan.

| **Accomplishments/Planned Program** | FY 2005 | FY 2006 | FY 2007 |
|---|---|---|---|
| FY05 Accomplished projects: Multi-Media Data Transfer System, High Speed Data Recording System, Global Positioning System Modernization, Improved Field Data Collection System v.4, Neural Network Based Software Upgrade, Mobile Instrumentation Support Van, Secure Wideband Satellite Commo Link, Satellite Tool Kit, Airborne Position Location System, Night Vision Enhancements, MCSTF Van Platform Upgrade, Command Audio Visual Modernization, Web Dag Enhancement, Synchronize OTC/EPG DPU Software, Direct Methanol Fuel Cell. DVER Compatibility with ATIN and CVII, Family Digital Data Collection. | 7887 | 0 | 0 |
| FY06 and FY07 Planned projects: Digital Asset Management System, Data Collection and Analysis Van, Mobile Surveillance and Target Acquisition Radar, OASIS MSI Integration FY06 Phase I, Networked Instrumentation Test System, OT-TES, Family of Digital Data Collectors Test Bed, Digital Image Editing Equipment, MCSTF Van Platform Upgrade, IEW Test Operations Capability, GPS Modernization, Neural Network Based Software, High Speed Data Recording System, NG CEES, Multi Media Data Transfer System, Quick Look Instrumentation Work Station. | 0 | 8798 | 12723 |
| Congressional increases for Dugway Proving Ground Testing and Infrastructure upgrades, Aberdeen Technology Transfer Initiative, White Sands Missile Range Film Elimination, Mobile Optical Tracking System, and Accelerator Based Neutron Production Study | 0 | 6600 | 0 |
| Total | 7887 | 15398 | 12723 |

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**February 2006**

| BUDGET ACTIVITY | PE NUMBER AND TITLE | PROJECT |
|---|---|---|
| **6 - Management support** | **0605602A - Army Technical Test Instrumentation and Targets** | **62C** |

| COST (In Thousands) | | FY 2005 Estimate | FY 2006 Estimate | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | FY 2010 Estimate | FY 2011 Estimate |
|---|---|---|---|---|---|---|---|---|
| 62C | MODELING AND SIMULATION INSTRUMENTATION | 5797 | 7165 | 14283 | 14509 | 14182 | 14738 | 11287 |

**A. Mission Description and Budget Item Justification:** Increased funding beginning in FY07 develops synthetic environments and instrumentation systems necessary to test FCS and Future Force systems under realistic operational conditions. This project provides the critical foundation necessary to develop and sustain the Army Test and Evaluation Command's (ATEC) current and future modeling and simulation (M&S) instrumentation efforts. ATEC's M&S efforts include: Simulation Testing Operations Research Model (STORM); Operational Test Command (OTC) Analytic, Simulation and Instrumentation Suite (OASIS); Command, Control and Communication Driver (C3Driver); Extensible C4I Instrumentation System - Fire Support Application (ExCIS-FSA); and the Intelligence Modeling and Simulation for Evaluation (IMASE). Systems that will benefit from this effort include, but are not limited to Stryker, Brigade Combat Team, Army Tactical Command and Control System (ATCCS), Advanced Field Artillery Tactical Data System (AFATDS), and Maneuver Control System (MCS), All Source Analysis System (ASAS), and Combat Service Support Control System (CSSCS). The additional funding in FY 2007 will provide Information Technology infrastructure and M&S instrumentation to test and evaluate the increasingly complex systems of the Army Future Force.

| **Accomplishments/Planned Program** | FY 2005 | FY 2006 | FY 2007 |
|---|---|---|---|
| Funds development and sustainment of high priority modeling and simulation instrumentation systems, such as STORM and OASIS. | 1597 | 2577 | 11887 |
| Funds development of the C3 Driver. The C3 Driver supports the Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Army Battle Command System (ABCS) 6.3, 6.4, Brigade Combat Team, Joint Tactical Radio System, and Warfighter Information Network -Tactical development and integration at the Central Technical Support Facility and contractor locations as the Army's single simulator/stimulator. | 4200 | 4588 | 2396 |
| Total | 5797 | 7165 | 14283 |