| Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Office of Secretary Of Defense | DATE: April 2013 |
|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603663D8Z: *Data to Decisions Advanced Technology* |

| COST ($ in Millions) | All Prior Years | FY 2012 | FY 2013# | FY 2014 Base | FY 2014 OCO ## | FY 2014 Total | FY 2015 | FY 2016 | FY 2017 | FY 2018 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | - | 4.536 | 13.754 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| P366: *Data to Decisions Advanced Technology* | - | 4.536 | 13.754 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |

# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

## The FY 2014 OCO Request will be submitted at a later date

**Note**

Change from FY 2013 to FY 2014 reflects a realignment of the program funds from the Data to Decisions Advanced Development PE 0603663D8Z to the new Applied Research for the Advancement of Science and Technology (S&T) Priorities PE 0602251D8Z.

The goals of this program will be shifted to the Department of Defense (DoD) Components under the direction of the Research and Engineering Executive Committee and will conform with the DoD Data to Decision Priority Steering Council roadmaps. Historically, the Joint Data Management program was restructured to evolve into the revised Data to Decisions program to support the FY 2010 Quadrennial Defense Review mission: Succeed in counterinsurgency, stability, and counterterrorism operations. In addition, this program addresses a signed Secretary of Defense S&T priority, Data to Decisions, which reduces the cycle time and manpower requirements for analysis and use of large data sets.

**A. Mission Description and Budget Item Justification**

As the DoD increases the capability and capacity to generate increasing amounts of data from numerous sensors in the battlespace, the issue of handling very large data sets has become more challenging. This is in part due to Department of Defense response to a changing threat environment where there is an expansion of the types of sensors deployed, new types of information collected, and different features used to classify these new threats. From a technical perspective, data creation speeds have outpaced the speed and ability to transport, store and process the data created. Science and Technology (S&T) investigation into new and novel ways to manage and exploit this data is required to more efficiently use sensor assets and effectively use information in a timely fashion.

The OSD Data to Decisions program (PEs 0602663D8Z and 0603663D8Z) uniquely address three specific gap areas not addressed by Component S&T: minimal dedicated Data to Decisions research to support Joint and emerging mission areas; DoD needs a mechanism to increase responsiveness of Component Data to Decisions research and lower the time-to-solution across a broad DoD-wide user base; and limited investment in multi-disciplinary research investigations of Data to Decisions issues and solutions. The OSD Data to Decisions program pulls together research efforts to address shortfalls within the context of Joint and emerging missions to ensure that the distinctive needs of these joint analysts and decision makers are addressed by DoD science and technology. As an example, irregular warfare, non-state terrorism movements, and uncertain environmental patterns that trigger major weather disasters are producing a reality for military and government leaders where traditional physics-based sensors alone are insufficient to plan current and future actions in a region on interest or need. Component Data to Decisions efforts focus on developing technology to overcome a particular challenge within a mission or advance a particular priority area of that Component, as a result the Research and Engineering Database has over 388 references to Decision Support programs all of which are designed to address a specific need over the course of

several years. However, there exists no other program in the DoD that focuses on technology development efforts to speed the delivery of the Component solutions and lessons learned to a DoD-wide user base. The OSD Data to Decisions program provides the common platform (access to datasets, infrastructure, and metrics) to integrate and evaluate the technology development and research methods to support various missions driven by the challenge problems. This ability to rapidly evaluate technology development and research methods will allow technology transfer for mission analysis not previously foreseen and lower the time-to solution across DoD by rigorously analyzing technical performance for more immediate use. Traditional approaches within research seek to advance machine systems for a specific mission effect resulting in large complex data sets. While necessary for sensor system improvements, potential Data to Decisions solutions require a coupling of automated data analysis with human analysts, operators and decision makers in order to reduce time and limit the number of people required. Many research studies, workshop and analysis have stated that solutions to data issues are multi-disciplinary. The OSD Data to Decisions program is in the unique position to reach across Components and research disciplines to blend promising research in new ways in response to Challenge Problem statements. For Challenge Problems, contextual understanding will result from research combining human sciences with computer processing techniques to take advantage of a person's cognitive ability to fuse and assimilate multiple sources and types of information for new insights.

| B. Program Change Summary ($ in Millions) | FY 2012 | FY 2013 | FY 2014 Base | FY 2014 OCO | FY 2014 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 4.117 | 13.754 | 13.797 | - | 13.797 |
| Current President's Budget | 4.536 | 13.754 | 0.000 | - | 0.000 |
| Total Adjustments | 0.419 | 0.000 | -13.797 | - | -13.797 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 0.420 | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Baseline Adjustments | - | - | -13.797 | - | -13.797 |
| • Other Adjustments | -0.001 | - | - | - | - |

**Change Summary Explanation**

FY 2014 baseline adjustments are reflective of DoD priorities and requirements.

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Office of Secretary Of Defense | | | DATE: April 2013 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603663D8Z: *Data to Decisions Advanced Technology* | PROJECT<br>P366: *Data to Decisions Advanced Technology* | |

| COST ($ in Millions) | All Prior Years | FY 2012 | FY 2013# | FY 2014 Base | FY 2014 OCO ## | FY 2014 Total | FY 2015 | FY 2016 | FY 2017 | FY 2018 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P366: *Data to Decisions Advanced Technology* | - | 4.536 | 13.754 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |

# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

## The FY 2014 OCO Request will be submitted at a later date

**Note**

Change from FY 2013 to FY 2014 reflects a realignment of the program funds from the Data to Decisions Advanced Development PE 0603663D8Z to the new Applied Research for the Advancement of Science and Technology (S&T) Priorities PE 0602251D8Z.

**A. Mission Description and Budget Item Justification**

The OSD Data to Decisions (D2D) program (PEs 0602663D8Z and 0603663D8Z) uniquely address three specific gap areas not addressed by Component Science and Technology: minimal dedicated D2D research to support Joint and emerging mission areas; DoD needs a mechanism to increase responsiveness of Component D2D research and lower the time-to-solution across a broad DoD-wide user base; and limited investment in multi-disciplinary research investigations of D2D issues and solutions.

The D2D program establishes the demonstration and experimentation environment to conduct independent evaluations of research efforts that have the most potential of minimizing the impact of the increasing amount of information available and required to support military operational decision-making. The intent is to leverage existing research investments within defense S&T and provide proper evaluations and assessments to facilitate technology transition. The Applied Research program concentrates on the Development portion of this collaborative effort, focusing on the development of improved algorithms (relative to FY 2012 state of the art) to be demonstrated and validated in the 6.3 D2D program test bed. The D2D Advanced Development (6.3) program uses a spiral development model with four-steps. Each year Operational teams will choose a series of cross-service challenge problems dominated by a specific sensing modality. Representative data for each of those problems will then be collected for testing against that problem. A Development team will design algorithms and data management architectures using high-level languages and self-test on controlled data sets to address those challenge problems. Independent assessment will occur with sequestered data sets, but each development tool will also be tested against new sensors not included in the self-testing to determine fragility and applicability. A transition team will host the developed algorithms as services in a spiraling prototype system that will support rapid prototyping and transition.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| ***Title:*** Operational Initiative | 0.228 | 3.500 | 0.000 |
| ***Description:*** The OSD D2D Program develops cross-service challenge problems from joint missions as a frame within the Operational Initiative, so that the research base can investigate technical challenges while these under-represented missions realize a timely and responsive benefit from DoD-wide talent with minimal investment. Challenge problems focus multiple levels of algorithm development across the DoD to catalyze a larger technical community to work D2D issues for Joint and future missions | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2014 Office of Secretary Of Defense | | DATE: April 2013 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603663D8Z: *Data to Decisions Advanced Technology* | PROJECT<br>P366: *Data to Decisions Advanced Technology* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| and also provide a basis for testing the reuse and repurposing of algorithms and systems for rapid repurposing of algorithms and systems that match the agility of threats and missions.<br><br>***FY 2012 Accomplishments:***<br>- Successfully engaged Combatant Command (COCOM) stakeholders via onsite visits to major COCOMs related to or supporting the U.S. Africa Command (AFRICOM) mission.<br>- Developed a detailed analysis of AFRICOM and supporting COCOM issues that have potential for mitigation by current or future DoD D2D research and technology development and/or analysis which included a listing of topic areas with supporting rationale and description that can be used to seed future research.<br>- Identified functions (decisions and processes) that would be impacted by a research investment based on needs driven by the scenario, which helped to define the future research thrusts and investments across DoD.<br>- Continued generating moving intelligence (MOVINT) data sources for the Development team.<br>- Continued to explore technical approaches, including investigating technical and legal challenges, for sanitizing data sets for use by non-U.S. citizens.<br>***FY 2013 Plans:***<br>- For one of the three scenario challenges identified in the FY 2012 AFRICOM Scenario, build detailed top-down data collection requirements, statistical analysis and evaluation plans for experimentation to support information fusion and decision support tests of emerging technologies. Demonstrate prototype applications in one or more COCOM exercises. Share with COCOM exercise planners.<br>- Complete the COCOM Decision Requirements Study by reaching out to COCOMs not visited in FY 2012 and by supporting elements of FY 2012 COCOMs who have expressed need for continued study/support. Deliver results to the D2D Priority Steering Council for inclusion into roadmaps and Component plans.<br>- Extend efforts to broadly understand the current state of D2D domains in space operations, counter weapons of mass destruction, human, social, culture, and behavior modeling, health information technology, and logistics.<br>- Identify mature technologies being developed within the D2D program, small business innovation research (SBIR) performers, and Navy Enterprise (Office of Naval Research and Naval Research Laboratory) to fuse data, clean dirty data, triage data, and compress data, to improve decision support. Deliver appropriate metrics through the knowledge engineering process.<br>- Deliver MOVINT data sources for the Development team. | | | |
| ***Title:*** Assessment Initiative<br><br>***Description:*** The Assessment team is responsible for test and evaluation, as well as architectural analysis. The team is the primary vehicle by which algorithm developers test their data on sequestered data sets. The team provides feedback to the Developers and Operational team and guides future test vectors. This team is also responsible for architectural analysis of the | 1.800 | 4.804 | 0.000 |

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| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603663D8Z: *Data to Decisions Advanced Technology* | PROJECT<br>P366: *Data to Decisions Advanced Technology* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| processing and user interface layers. To this end, the team conducts quantitative analysis of algorithm performance requirements and conducts user interface experiments in human factors.<br><br>***FY 2012 Accomplishments:***<br>- Hand truthed 28 minutes of WAMI MOVINT data and released the data to the performers and when possible made the data sets publicly available.<br>- Adapted and extended the AFRL COMPASE Tracker Evaluation Software Suite (CTESS) track evaluation tool for measuring performance of tracking algorithms.<br>- Conducted quantitative analysis to develop a processing architecture for text analytics. Work with the Operational team on specific problem sets.<br>- Provided data analysis to evaluate tools and applications for temporal/spatial resolutions and space/time correlations for cueing, entity tracking, and data layering of disparate data sets into a single picture. This included independent assessment and evaluation of tools and algorithms.<br>- Reference tool chain and prototype of workflow service for WAMI network analysis demonstrated on testbed. Demonstrated interoperation of modules and defined a common architecture that could be executed by a single operator.<br>***FY 2013 Plans:***<br>- Complete the assessment of MOVINT modules; provide extensive feedback to Operational Team on test results to guide further FY 2013 collections.<br>- Develop and deliver ground-truth data for text/imagery analysis relevant to challenge problem.<br>- Transition the Automated Online Data Repository (AODR) to the wider development community by including additional datasets with analytic studies of tools/applications.<br>- Adapt testbed to accommodate text workflow that supports the AFRICOM centric challenge problem. | | | |
| ***Title:*** Transition Initiative<br><br>***Description:*** This team transitions the prototype algorithms developed by the Applied Research program into a library of D2D modules. The team is also responsible for building the consortium infrastructure for storage, revision control, development and testing. The final D2D system architecture will be developed by this team using an internal testbed to conduct architectural analysis.<br><br>***FY 2012 Accomplishments:***<br>- Began initial experiments in scalability of algorithms and modules over large data sets.<br>- Developed a D2D Program roadmap for algorithm advancements in data management layer.<br>- Participated in four experiments including USMC Mojave, NGA Afghanistan LOE (ALOE 2), NGA Enterprise Resolve 12 (ER12) and IC Trident Spectre 2012 collecting data and demonstrating specific functions. | 2.508 | 5.450 | 0.000 |

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| B. Accomplishments/Planned Programs ($ in Millions) | FY 2012 | FY 2013 | FY 2014 |
|---|---|---|---|
| - Developed and standardized ICDs for analytics. Enhancements required by the D2D system were communicated back to the community through the National Geo-spatial Intelligence Agency's (NGA) Motion Imagery Standards Board (MISB).<br>***FY 2013 Plans:***<br>- Complete experiments in scalability of algorithms and modules over large data sets.<br>- Develop and deliver the roadmap for algorithm advancements in data management layer.<br>- Transition the D2D system testbed to the DoD D2D Priority Steering Council members to conduct architectural analysis and transitioning the prototype algorithms.<br>- Investigate expansion of the testbed to support text analytics by DoD Component programs.<br>- Complete experiments in scalability of algorithms and modules over large data sets. | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.536 | 13.754 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2012 | FY 2013 | FY 2014 Base | FY 2014 OCO | FY 2014 Total | FY 2015 | FY 2016 | FY 2017 | FY 2018 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • BA 2, PE# 0602663D8Z, P266: *Data to Decisions Applied Research* | 4.128 | 13.753 | 0.000 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |

**Remarks**

Change from FY 2013 to FY 2014 reflects a realignment of the program funds from the Data to Decisions Applied Research PE 0602663D8Z to the new Applied Research for the Advancement of Science and Technology (S&T) Priorities PE 0602251D8Z. The goals of the program will be shifted to the DoD Components under the direction of the Research and Engineering Executive Committee and will conform with the DoD Data to Decision Priority Steering Council roadmaps.

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

N/A