Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Office of Secretary Of Defense										DATE: February 2011	
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603663D8Z: *Data to Decisions Advanced Technology*							
COST ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	4.797	6.289	9.235	-	9.235	14.140	14.182	19.135	19.163	Continuing	Continuing
P366: *Data to Decisions Advanced Technology*	4.797	6.289	9.235	-	9.235	14.140	14.182	19.135	19.163	Continuing	Continuing

Note

The Joint Data Management program has been restructured in FY 2012 to become an expanded Data-to-Decisions program that addresses additional challenges from the Quadrennial Defense Review and Combatant Commanders. This expanded program builds on the FY 2010 and FY 2011 accomplishments with increased objectives and technology developments critical to on-going operations. This Data to Decisions program focuses on information management architecture needs located at the seams between ongoing Service research efforts.

A. Mission Description and Budget Item Justification

A critical element in nearly all defense missions is the Decision Support System, which manages the accumulation of important data and provides tools to help commanders make relevant decisions. These “Data-to-Decision” systems have become increasingly more important as our operations have shifted from large-scale force-on-force engagements to asymmetric conflicts. Terrorists and insurgents are deeply buried within local populations and employ operational concepts that blend in with urban clutter. Subsequently, finding these asymmetric targets has driven an explosion in sensing capabilities and modalities. This exponential growth in sensing volume has so stressed our current technologies that the majority of data now collected is thrown away. Additionally, because the targets are diffuse and rapidly adapt to countermeasures, there has been a rapid proliferation of decision support systems. At last count, the Research & Engineering Database had over 388 references to Decision Support programs.

The goal of this program is to develop an Information Open System Architecture (IOSA) that provides a common platform for rapidly developing and integrating new Data-to-Decisions systems. This IOSA will be based on a canonical decision support architecture and support a physical infrastructure for multi-source data management as well as user-driven innovation tools for analytics. The data management infrastructure will provide easy access and management of current and emergent data sources through plug-and-play modules. Data will be contextualized, indexed, conditioned and intelligently stored with approved formats to allow rapid search and retrieval of tactically relevant data sets. The effort will integrate existing analytics tools, and develop applicable new ones where gaps exist. A library of analytic tools will be built and research into end user programming methods will support new innovation models that mimic commercially successful products. The program consists of both applied research and technology development efforts focused on solving challenge problems each year with spiral developments to a prototype system.

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Office of Secretary Of Defense	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603663D8Z: *Data to Decisions Advanced Technology*

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	4.935	6.289	10.636	-	10.636
Current President's Budget	4.797	6.289	9.235	-	9.235
Total Adjustments	-0.138	-	-1.401	-	-1.401
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.091	-			
• Other Program Adjustments	-0.047	-	-0.636	-	-0.636
• Defense Efficiency - Reports, Studies, Boards, and Commissions	-	-	-0.751	-	-0.751
• Economic Assumptions	-	-	-0.014	-	-0.014

Change Summary Explanation

Baseline Review. As part of the Department of Defense reform agenda, implements a zero-based review of the organization to align resources to the most critical priorities and eliminate lower priority functions.

Defense Efficiency - Report, Studies, Boards and Commissions. As part of the Department of Defense reform agenda, reflects a reduction in the number and cost of reports, studies, DoD Boards and DoD Commissions below the aggregate level reported in the previous budget submission.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603663D8Z: *Data to Decisions Advanced Technology*	PROJECT P366: *Data to Decisions Advanced Technology*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
P366: *Data to Decisions Advanced Technology*	4.797	6.289	9.235	-	9.235	14.140	14.182	19.135	19.163	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Data Management (JDM) program will be restructured in FY 2012 to become an expanded Data-to-Decision program. This Data-to-Decision program builds on the FY 2010 and FY 2011 accomplishments with increased objectives and technology developments critical to on-going operations. The JDM program is described below and included two tasks as outlined in the accomplishments/planned program section:

As the Department of Defense 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, sensor processing 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.

This advanced technology demonstration program will establish 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 required within 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. These objective assessments will be conducted and coordinated across the defense research base and with other parts of government to include Director, National Intelligence and Department of Homeland Security.

The new Data-to-Decisions program will build on the JDM program by focusing on the development of open-architecture technologies for decision support systems to help reduce future development time and cost of data management, analytics and user interface subsystems. The program will use 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. A Transition team will host the developed algorithms as services in a spiraling prototype system.

The Applied Research program will concentrate on the Development portion of this collaborative effort, while the Advanced Technology Development program focuses on the infrastructure piece. This piece includes an Operational, Assessment and Transition initiative.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Novel Information Architectures	1.370	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603663D8Z: *Data to Decisions Advanced Technology*	PROJECT P366: *Data to Decisions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Description: Both the size of the data to be transferred and the growing size of databases require novel architectural approaches to provide the adaptability and usability. Current databases, file systems and network protocols will not keep pace. Additionally, the level of automation required will necessarily impact the expectation of man/machine interaction and their performance. Research areas to be explored may include reconfigurable, scalable, and dynamic systems; re-indexing, association, and ontological representation for distributed and streaming data; many core file and operating systems, management and scheduling, and optimized algorithms; operationally relevant metrics and figures of merit for architecture performance, security, and vulnerability. Program Outputs and Efficiencies – Improved knowledge regarding system and network component performance which can be leveraged across defense S&T and development communities. ***FY 2010 Accomplishments:*** - Conducted detailed study of exisiting programmatic architectures across multiple Service missions areas - Developed process for characterizing performance of these systems, evaluating the strengths and weaknesses of the core technology and defining appropriate metrics. - Developed a testbed architecture to be used in the Data-to-Decisions program that includes hardware, software and development framework. Started building this system using existing hardware and defining the process by which performers can use the system.			
Title: Experimentation and Demonstration Program ***Description:*** Examine relevant DoD problem domains such as Wide Area Surveillance and Biometrics where recommended research solutions for handling large data can have the most impact. In order to conduct experimentation and assessments, test data sets and methodologies will be collected and developed. Assessment methods and performance metrics will be used to compare research options and solution potential. Several factors will be considered during these evaluations, to include; the basis of making a decision or taking an action; how access to this data has operational impact; make a difference, can the data feature be detected and processed (e.g. extracted) from the large data set and can the data be accessed and processed to support the decision, action or analysis. Program Outputs and Efficiencies – Data to support potential solutions for handling large amounts of data. ***FY 2010 Accomplishments:*** - Surveyed and catalogued existing data sets relevant to each Service missions. Developed a database of these data sets that contained important information like target types, ground truth, sensor types, and restrictions.	3.427	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603663D8Z: *Data to Decisions Advanced Technology*	PROJECT P366: *Data to Decisions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Gathered data sets for the FY 2011 Data-to-Decisions effort. - Conducted a study to characterize the properties and statistics of these data sets with the goal of developing a common mathematical data structure for the Data-to-Decisions effort. - Started effort to process video synthethic aperture radar data on a high bred cluster for a demonstration.			
Title: Operational Initiative ***Description:*** The Operational team is responsible for choosing a set of cross-service challenge problems to form a basis for developing and testing the processing and exploitation algorithms developed by the Development team. The team must collect and manage the relevant data sets used in both development and testing. Because this program is designed to specifically encourage non-traditional, highly innovative companies to participate, this team must be responsible for determining methods for providing unclassified data sets to the performers. ***FY 2011 Plans:*** - Each Service is responsible for choosing a relevant mission dominated by (MOVing INTelligence) MOVINT data sources, and then finding a data source for that mission. - Develop a means for gathering unclassified data to provide to the Development team. This data should be representative of the extended operating conditions the algorithms have the most difficulty solving. ***FY 2012 Plans:*** - Continue generating MOVINT data sources for the Development team. - Conduct a study to determine the particular problems and solutions needed for missions dominated by text input data. Find representative data sets to capture these problems and generate a set of significant challenge problems for the Development team.	-	1.596	2.000
Title: Assessment Initiative ***Description:*** The Assessment team is responsible for test and evaluation, as well as architectural analysis. The team will be the primary vehicle by which algorithm developers test their data on sequestered data sets. The team will provide feedback to the Developers and Operational team, and will guide future test vectors. This team will also be responsible for architectural analysis of the processing and user interface layers. To this end, the team will conduct quantitative analysis of algorithm performance requirements, and will conduct user interface experiments in human factors. ***FY 2011 Plans:*** - Assess early MOVINT modules in tracking and graph analytics and characterize performance as a function of extended operating condition, sensor and target.	-	2.193	2.194

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603663D8Z: *Data to Decisions Advanced Technology*	PROJECT P366: *Data to Decisions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Begin early experiments in user interfaces and collaboration models through red-blue experiments and human factor studies. ***FY 2012 Plans:*** - Continue assessment of MOVINT modules, provide extensive feedback to Operational Team on test results to guide FY 2012 collections. - Continue experimenting with user interfaces through red-blue exercises and human factor studies. Develop roadmap for algorithm advances in the user interface layer. - Conduct quantitative analysis to develop a processing architecture for text analytics. Work with the Operational team on specific problem sets.			
Title: Transition Initiative ***Description:*** This team is responsible for transitioning the prototype algorithms developed by the Applied Research program into a library of Data-to-Decisions modules. This team is also responsible for building the consortium infrastructure for storage, revision control, development and testing. The final Data-to-Decisions system architecture will be developed by this team using an internal testbed to conduct architectural analysis. ***FY 2011 Plans:*** - Build and implement a workspace for the Development team in the applied research program. Populate this workspace with data from the Operational Team. - Define the architecture and components for a Data-to-Decisions testbed that will be used for the remainder of this program. ***FY 2012 Plans:*** - Build multi-core testbed with approximately 100+ nodes on a 10 GB Ethernet backbone that is fully partitionable. - Begin initial experiments in scalability of algorithms and modules over large data sets. Develop roadmap for algorithm advancements in data management layer.	-	2.500	5.041
Accomplishments/Planned Programs Subtotals	4.797	6.289	9.235

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603663D8Z: *Data to Decisions Advanced Technology*	PROJECT P366: *Data to Decisions Advanced Technology*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• BA 2, PE# 0602663D8Z, P266: *Data-to-Decisions Applied Research*	0.000	2.711	9.079		9.079	14.139	14.180	19.135	19.162	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A