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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2012 Office of Secretary Of Defense **DATE:** February 2011

<b>APPROPRIATION/BUDGET ACTIVITY</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide</i> BA 3: <i>Advanced Technology Development (ATD)</i>	<b>R-1 ITEM NOMENCLATURE</b> PE 0603745D8Z: <i>Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)</i>
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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	4.676	-	-	-	-	-	-	-	-	Continuing	Continuing
P745: <i>Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)</i>	4.676	-	-	-	-	-	-	-	-	Continuing	Continuing

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

The Synthetic Aperture Radar (SAR) Coherent Change Detection (CCD) Initiative encompassed four phases to develop deployable systems capable of achieving SAR with real time CCD for tactical intelligence. Phase one, completed in FY 2008, validated the utility of existing small SAR sensors for use as a CCD platform. CCD post processing was used to establish current SAR capabilities for change detection thresholds. Phase Two, completed in FY 2009, demonstrated real-time CCD on a manned, SAR-equipped, platform. This real time enhancement is capable of being retro fitted on existing manned SAR platforms. Phase Three developed the engineering enhancements necessary to integrate a real time SAR CCD capability on a small Unmanned Aerial Vehicle (UAV). All necessary software was developed during Phase Three. Phase Four (FY 2010 / FY 2011) extended the capability to an affordable small unmanned aircraft with a miniaturized SAR system. In FY 2011, the project will successfully meet its goal to develop a deployable system with a SAR sensor capable of achieving near real time CCD on a small UAV to be operated by the tactical commander and at a cost of \$500,000 per SAR CCD sensor package.

FY 2010 represents the last year of funding for this project. Because FY 2010 funds continue to produce results in FY 2011, this program is considered effectively completed in FY 2011. Under Army G2 sponsorship, SAR CCD is being operationally deployed.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2010</b>	<b>FY 2011</b>	<b>FY 2012 Base</b>	<b>FY 2012 OCO</b>	<b>FY 2012 Total</b>
Previous President's Budget	4.825	-	-	-	-
Current President's Budget	4.676	-	-	-	-
Total Adjustments	-0.149	-	-	-	-
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.142	-			
• Other Program Adjustments	-0.007	-			

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**Change Summary Explanation**

FY 2010 represents the last year of funding for this project. Because FY 2010 funds continue to produce results in FY 2011, this program is considered effectively completed in FY 2011. Under Army G2 sponsorship, SAR CCD is being operationally deployed.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2012 Office of Secretary Of Defense **DATE:** February 2011

<b>APPROPRIATION/BUDGET ACTIVITY</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide</i> BA 3: <i>Advanced Technology Development (ATD)</i>	<b>R-1 ITEM NOMENCLATURE</b> PE 0603745D8Z: <i>Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)</i>	<b>PROJECT</b> P745: <i>Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)</i>
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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
P745: <i>Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)</i>	4.676	-	-	-	-	-	-	-	-	Continuing	Continuing

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

The Synthetic Aperture Radar (SAR) Coherent Change Detection (CCD) Initiative encompassed four phases to develop deployable systems capable of SAR with real time CCD processing to provide over the horizon alerts for terrain changes above a given threshold. The focus is on increasing the situational awareness of small dispersed units operating in large areas.

Phase One (FY2008) validated the performance of existing lightweight SAR systems using CCD for detecting a variety of human activities through rigorous testing.

Phase Two (FY2009) demonstrated near real-time CCD on a manned SAR-equipped platform. Results were used to determine functional requirements and develop a system concept of operations (CONOPS).

Phase Three (FY2009) developed the engineering enhancements necessary to integrate a real time SAR CCD capability on a small Unmanned Aerial Vehicle (UAV). All necessary software was developed during this phase.

Phase Four (FY 2010 / FY 2011) extended the capability to an affordable small unmanned aircraft with a miniaturized SAR system. Phase Four decreased procurement costs of a small SAR with a real time CCD capability to \$500,000 per sensor package. This compares to a current cost of approximately \$1.2 million for a spot SAR system.

Upon the conclusion of the project, SAR CCD was incorporated via the Leonardo radar into the Shadow 200 (UAV) Program of Record . The US Army has adopted the CCD capability for use on the STARTLite radar which is used on the Grey Eagle (US Army Predator variant). The project also demonstrated a ground based processing capability that could be used for other radars beyond the STARTLite and ImSAR systems.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2010	FY 2011	FY 2012
<b>Title:</b> Extend miniaturized SAR system capability to an affordable UAV	4.676	-	-
<b>Description:</b> Phase Four accomplished the following: - A robust CONOPS - A front-end software package with a rich user experience			
<b>FY 2010 Accomplishments:</b>			

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2010</b>	<b>FY 2011</b>	<b>FY 2012</b>
Phase Four of the Synthetic Aperture Radar (SAR) Coherent Change Detection (CCD) initiative successfully extended the SAR capability to an affordable small Unmanned Aerial Vehicle (UAV) with a miniaturized system. FY 2010 funds will continue to produce additional Phase Four results in FY 2011. Deliverables in FY 2011 will include decreasing procurement costs of a small SAR with a real time CCD capability to \$500,000 per sensor package. Additionally, the near real-time SAR CCD capability will be integrated onto a tactical sized UAV with a sensor package cost of not more than \$500,000. All funding required to complete the project was provided in FY 2010. No further funding will be provided for this project in FY 2011.			
<b>Accomplishments/Planned Programs Subtotals</b>	4.676	-	-

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

N/A

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

This project developed a deployable system with a SAR sensor capable of achieving real time CCD on a small UAV tested by the tactical commander and at a cost of \$500,000 per SAR CCD sensor package.