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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development					R-1 Program Element (Number/Name) PE 1202140F I Service Support to U.S. SPACECOM Activities							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	11.863	0.000	11.863	9.014	9.192	9.324	9.567	Continuing	Continuing
672486: JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES	-	0.000	0.000	7.467	0.000	7.467	7.513	7.583	7.723	7.862	Continuing	Continuing
67A011: Space Analysis and Application Development	-	0.000	0.000	4.396	0.000	4.396	1.501	1.609	1.601	1.705	Continuing	Continuing

Note

Prior to the FY20 PB cycle, The Space Analysis and Application Development Program (WSC 67A011) and the Joint Navigation and Warfare Center (WSC 672486) were reported under PE 1201921F, Service Support to STRATCOM - Space Activities. Beginning in FY20, the programs will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities

A. Mission Description and Budget Item Justification

The Space Analysis and Application Development program integrates space based effects into Department's 'Model of Record' for joint campaign analysis. Current modeling and simulation (M&S) models are inadequate to represent the contribution that U.S space capabilities make to the air, sea, and land fight and do not accurately portray current and future space threats. This line of effort integrates effects of space capabilities into the Synthetic Theater Operations Research Model (STORM) and other mission and campaign-level M&S tools. Enhanced space M&S will enable the DoD to make informed decisions regarding the direction of U.S. Space Doctrine, Tactics, Techniques, Procedures, and Resource Decisions. The DoD requires the ability to conduct campaign-level analysis to quantify the holistic operational impacts of adversary space actions on military campaigns and U.S. global operations.

Navigation Warfare (NAVWAR) is deliberate defensive and offensive action to assure positioning, navigation, and timing (PNT) information through coordinated employment of space, cyberspace, and electronic warfare (EW) operations. Funds are used to create and maintain NAVWAR knowledge. NAVWAR expertise is developed in part by execution of PNT Operational Field Assessments (POFAs). GYPSY POFA's are linked to Combatant Commander's (CCMD) Tier 1 exercises (USSTRATCOM's Global Lightning and Global Thunder are examples) and provide operational realistic threat-representative, GPS-contested environments for analytical assessment of air, ground, maritime, space & cyberspace mission capability. FORTUNE POFAs are PNT capability and vulnerability assessments associated with a Service exercise or mission event. PRISM POFAs encompass all Operations, Actions, and Activities (OAAs) associated with events outside of specific CCMD and/or service exercises or mission events. Assessments inform service acquisition decisions, capability gaps, intelligence gaps and tactics, techniques and procedures (TTP) development and implementation to mitigate effects on warfighter operations in the anticipated theater NAVWAR threat environments. JNWC assesses Department wide PNT posture through the PNT Annual assessment IAW DoDI 4650.08.

As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.

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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to U.S. SPACECOM Activities</i>
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This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

<u>B. Program Change Summary (\$ in Millions)</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	11.863	0.000	11.863
Total Adjustments	0.000	0.000	11.863	0.000	11.863
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	11.863	0.000	11.863

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 1202140F / Service Support to U.S. SPACECOM Activities				Project (Number/Name) 672486 / JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
672486: JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES	-	0.000	0.000	7.467	0.000	7.467	7.513	7.583	7.723	7.862	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Beginning in FY20 all funding from RDT&E funding from PE 1201921F Service Support to STRATCOM - Space Activities, moved to PE 1202140F - Service Support to U.S. SPACECOM Activities

A. Mission Description and Budget Item Justification

Navigation Warfare (NAVWAR) is deliberate defensive and offensive action to assure positioning, navigation, and timing (PNT) information through coordinated employment of space, cyberspace, and electronic warfare (EW) operations. Funds are used to create and maintain NAVWAR knowledge. NAVWAR expertise is developed in part by execution of PNT Operational Field Assessments (POFAs). GYPSY POFA's are linked to Combatant Commander's (CCMD) Tier 1 exercises (USSTRATCOM's Global Thunder and Global Lightning are examples) and provide operational realistic threat-representative, GPS-contested environments for analytical assessment of air, ground, maritime, space & cyberspace mission capability. FORTUNE POFAs are PNT capability and vulnerability assessments associated with a Service exercise or mission event. PRISM POFAs encompass all Operations, Actions, and Activities (OAAs) associated with events outside of specific CCMD and/or service exercises or mission events. Assessments inform service acquisition decisions, capability gaps, intelligence gaps and tactics, techniques and procedures (TTP) development and implementation to mitigate effects on warfighter operations in the anticipated theater NAVWAR threat environments. JNWC assesses department wide PNT posture through the PNT Annual assessment IAW DoDI 4650.08.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: PNT Operational Assessments	0.000	0.000	7.467	0.000	7.467
Description: The JNWC will investigate, operationally assess, and simulate potential threats and mitigation strategies for denial of blue force PNT capabilities as well as preventing the hostile use of PNT information. Major Performers - Best value to the government selected contractors, universities, government facilities, federally funded research and development centers, laboratories, or other organizations					
FY 2019 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force				Date: February 2019		
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to U.S. SPACECOM Activities</i>		Project (Number/Name) 672486 / <i>JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES</i>		
B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Operational assessments - Simulate potential threats and mitigation strategies for potential denial of blue force PNT capabilities - Continuing development to prevent the hostile use of Positioning, Navigation and Timing (PNT) information						
FY 2020 Base Plans: Continuing Operational assessments - Simulate potential threats and mitigation strategies for potential denial of blue force PNT capabilities - Continuing development to prevent the hostile use of Positioning, Navigation and Timing (PNT) information.						
FY 2020 OCO Plans: No OCO requested						
FY 2019 to FY 2020 Increase/Decrease Statement: Increase between FY19 (\$7.427M in PE 1201921F) and 20 (\$7.467M in PE 1202140F) is due to programmed inflation						
Accomplishments/Planned Programs Subtotals		0.000	0.000	7.467	0.000	7.467
C. Other Program Funding Summary (\$ in Millions) N/A						
Remarks Prior to the FY20 PB cycle, The Joint Navigation Warfare Center was reported under PE 1201921F, WSC 672486. Beginning in FY20, the program will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities						
D. Acquisition Strategy New contracts will be awarded using competitive procedures to the maximum extent possible.						
E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.						

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 1202140F / Service Support to U.S. SPACECOM Activities					Project (Number/Name) 672486 / JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES				

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost To Complete	Total Cost	Target Value of Contract
Position Navigation and Timing Operational Field Assessments	PO	Multiple, Kirtland AFB NM : Kirtland, NM	-	-		-		7.467	Oct 2019	0.000		7.467		Continuing	Continuing	-
Subtotal			-	-		-		7.467		0.000		7.467		Continuing	Continuing	N/A

Remarks
 Prior to the FY20 PB cycle, The Joint Navigation and Warfare Center (JNWC) was reported under PE 1201921F, WSC 672486. Beginning in FY20, the program will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-	0.000	7.467	0.000	7.467	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force										Date: February 2019									
Appropriation/Budget Activity					R-1 Program Element (Number/Name)					Project (Number/Name)									
3600 / 7					PE 1202140F / Service Support to U.S. SPACECOM Activities					672486 / JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES									

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Navigation Warfare (NAVWAR)																												
NAVWAR Operational Field Assessments																												
Create / Maintain NAVWAR Knowledge																												
NAVWAR Operational and CONOPS Events																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / Service Support to U.S. SPACECOM Activities	Project (Number/Name) 672486 / JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Navigation Warfare (NAVWAR)				
NAVWAR Operational Field Assessments	1	2020	4	2024
Create / Maintain NAVWAR Knowledge	1	2020	4	2024
NAVWAR Operational and CONOPS Events	1	2020	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 1202140F / Service Support to U.S. SPACECOM Activities				Project (Number/Name) 67A011 / Space Analysis and Application Development			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
67A011: Space Analysis and Application Development	-	0.000	0.000	4.396	0.000	4.396	1.501	1.609	1.601	1.705	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities

This is NOT a new start.

A. Mission Description and Budget Item Justification

The Space Analysis and Application Development program Integrates space based effects into Department's 'Model of Record' for joint campaign analysis. Current modeling and simulation (M&S) models are inadequate to represent the contribution that U.S space capabilities make to the air, sea, and land fight and do not accurately portray current and future space threats. This line of effort integrates effects of space capabilities into the Synthetic Theater Operations Research Model (STORM) and other mission and campaign-level M&S tools. Enhanced space M&S will enable the DoD to make informed decisions regarding the direction of U.S. Space Doctrine, Tactics, Techniques, Procedures, and Resource Decisions. The DoD requires the ability to conduct campaign-level analysis to quantify the holistic operational impacts of adversary space actions on military campaigns and U.S. global operations.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Space Campaign Modeling and Simulation, Development/Modification/Verification/Validation	0.000	0.000	4.396	0.000	4.396
Description: Developed, modifies, verifies, and validates new models for Space mission areas and modifies existing models to portray new capabilities					
FY 2019 Plans:					
- Conduct mission-level modeling and analysis to quantify the effects of US and adversary space interactions, with focus on six of the Joint Mission Threads (JMTs) developed in FY17					
- Review and update JMTs focused on the Sea Domain, and account for evolved Techniques, Tactics, and Procedures (TTPs) for those missions.					
- In coordination with European Command and Pacific Command, identify and select 4 joint missions for mission-level analysis and integration into campaign-level modeling					

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Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 1202140F / Service Support to U.S. SPACECOM Activities		Project (Number/Name) 67A011 / Space Analysis and Application Development		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<div>- Analyze/assess modeling results to determine impact/effects of space activities on U.S. military campaigns and global operations</div> <div>- Assess and integrate enterprise-level model data for Environmental Monitoring and ISR space-based capabilities into campaign-level modeling</div> <div>- Coordinate and update Blue space order of battle data, Red counterspace order of battle data, and Red counterspace CONOPS to support integration of space into mission and campaign-level M&S</div> <div>- Support cost-benefit analyses of Offensive Space Control alternatives with quantifiable impacts to warfighter operations</div> <div>- Develop change request proposals and submit to STORM Configuration Control Board (CCB) to improve instantiation of denied/degraded Intelligence, Surveillance, and Reconnaissance (ISR) space-based capability and its effects on the Warfighter in STORM</div> <div>- In coordination with HAF/A9 (Headquarters Air Force Studies, Analyses and Assessments), develop schedule and identify funding requirements and sources toward implementation of approved change requests and improved instantiation of space and contested space capabilities in STORM</div> <div>- Provide Modeling, Simulation, and Analysis support to inform Air Force Space Command's Space Enterprise Vision (SEV)</div> <div>No OCO Requested</div> <div>FY 2020 Base Plans:<div>- In coordination with HAF A/9 (HQ Air Force Studies, Analysis, and Assessments), develop schedule to identify requirements toward implementation of approved change requests and instantiation of space and contested space capabilities in STORM</div><div>- Coordinate and update Blue space order of battle data, Red counter-space order of battle data, and Red counter-space CONOPS to support integration of contested space into mission and campaign-level M&S</div></div>						

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force				Date: February 2019	
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 1202140F / Service Support to U.S. SPACECOM Activities		Project (Number/Name) 67A011 / Space Analysis and Application Development	
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<ul style="list-style-type: none"> - Continue development of software and tools to model Red on Blue contested space (one versus one, many versus many, and space campaign-level) - Update likelihood assessment data for Red counter-space capability (likelihood to employ, and likelihood to be effective) to inform counter-space risk assessment and enterprise-level modeling - Review and update JMT consequence assessment used to inform risk analyses and enterprise level modeling - Utilize updated tools and data to support analytical efforts of new Space Analysis Consortium, and collaborate with partners to inform senior leader forums and decisions on space investments, requirements, acquisition, and operational risk decisions - Support cost benefit analyses of Space Control activities with quantifiable impacts to warfighter operations - Provide analysis support to inform Air Force Space Command's Space Enterprise Vision (SEV) <p>No OCO Requested</p> <p>FY 2020 OCO Plans: No OCO requested</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Planned reduction between FY19 and FY20 is due to realignment of a portion of the RDT&E portfolio into Operations and Maintenance to support capabilities that have transitioned from a development program to an operational capability.</p>					
Accomplishments/Planned Programs Subtotals	0.000	0.000	4.396	0.000	4.396
C. Other Program Funding Summary (\$ in Millions)					
N/A					
Remarks					
Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / Service Support to U.S. SPACECOM Activities	Project (Number/Name) 67A011 / Space Analysis and Application Development
D. Acquisition Strategy Any new projects funded in this program will be awarded using competitive procedures to the maximum extent possible.		
E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 1202140F / Service Support to U.S. SPACECOM Activities						Project (Number/Name) 67A011 / Space Analysis and Application Development			
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Model Space effects for two mission tasks and integrate into STORM for joint campaign analysis	C/CPAF	TBD : TBD	-	0.000	Oct 2018	0.000	Oct 2019	4.396	Oct 2019	0.000		4.396	Continuing	Continuing	-
Subtotal			-	0.000		0.000		4.396		0.000		4.396	Continuing	Continuing	N/A
Remarks Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, USSPACECOM															
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	0.000		0.000		4.396		0.000		4.396	Continuing	Continuing	N/A
Remarks Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, USSPACECOM															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force

Date: February 2019

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 1202140F / Service Support to U.S.
SPACECOM Activities

Project (Number/Name)

67A011 / Space Analysis and Application
Development

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Space Analysis Modeling and Simulation																												
Complete Mission-level modeling and analysis for 22 Joint Mission Threads																												
Complete priority integration of 22 Joint Mission Threads, space-based capabilities, and counter-space effects on the Warfighter in STORM																												
Run Improved STORM model and update integrated risk analysis with Combatant Commands																												
Identify and develop 10 additional Joint Mission Threads for integration into mission and campaign level modeling																												
Develop software and tools to model Red on Blue contested space environment. Develop space playbook to define Red counter-space threat																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to U.S. SPACECOM Activities</i>	Project (Number/Name) 67A011 / <i>Space Analysis and Application Development</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Analysis Modeling and Simulation</i>				
Complete Mission-level modeling and analysis for 22 Joint Mission Threads	1	2020	4	2020
Complete priority integration of 22 Joint Mission Threads, space-based capabilities, and counter-space effects on the Warfighter in STORM	1	2021	4	2021
Run Improved STORM model and update integrated risk analysis with Combatant Commands	1	2022	4	2022
Identify and develop 10 additional Joint Mission Threads for integration into mission and campaign level modeling	1	2023	4	2023
Develop software and tools to model Red on Blue contested space environment. Develop space playbook to define Red counter-space threat	1	2024	4	2024

Note

Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, USSPACECOM