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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>
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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	-	106.646	48.070	62.715	0.000	62.715	67.731	62.234	55.023	44.705	Continuing	Continuing
666157: <i>Development Planning</i>	-	47.383	25.007	15.533	0.000	15.533	15.830	16.159	16.461	16.768	Continuing	Continuing
666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i>	-	59.263	23.063	47.182	0.000	47.182	51.901	46.075	38.562	27.937	Continuing	Continuing

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

The Requirements Analysis and Maturation (RAM) program funds development planning (DP) to include early systems engineering and integrated simulation and analysis. These activities include requirements analysis, capability decomposition and trade space characterization, concept development (system of systems, air, space, and cyber) and architecture design and development, cost analysis, modeling and simulation of representative or prototype systems, and analytical tools. Outcomes of these activities are technologically informed requirements, mature concepts that are technically feasible, and areas for science and technology (S&T) investment to reduce technology risks. These activities provide the analytic basis for cost and capability trades driving non-materiel solutions, and/or materiel solutions. Early-phase systems engineering and technical planning activities funded by this program provide the foundation for informed investment decisions leading to successful acquisition programs. Development planning efforts are coordinated with the Air Force Capability Development Council, Air Force Warfighting Integration Capability, and/or SAF/AQ to ensure funding supports the highest Air Force priorities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver development planning and integrated simulation and analysis capabilities (to include Simulation and Analysis Facility (SIMAF) support and Joint Simulation Environment (JSE) capability). The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	35.453	35.285	59.433	0.000	59.433
Current President's Budget	106.646	48.070	62.715	0.000	62.715
Total Adjustments	71.193	12.785	3.282	0.000	3.282
• Congressional General Reductions	-0.135	-0.215			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	74.000	13.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-2.672	0.000			
• Other Adjustments	0.000	0.000	3.282	0.000	3.282

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project: 666157: *Development Planning***

Congressional Add: *Program Increase - Air Superiority 2030 Planning for Development*

Congressional Add: *Program Increase - Global Strike Command Analytics*

Congressional Add: *Program Increase - Nuclear Modernization Analytics*

Congressional Add: *Program Increase - Nuclear Deterrence Research*

Congressional Add Subtotals for Project: 666157

**Project: 666158: *INTEGRATED SIMULATION AND ANALYSIS***

Congressional Add: *Program Increase - Modeling and Simulation - Joint Simulation Environment*

Congressional Add Subtotals for Project: 666158

Congressional Add Totals for all Projects

	<b>FY 2018</b>	<b>FY 2019</b>
	29.440	0.000
	6.800	0.000
	0.000	8.000
	0.000	5.000
	36.240	13.000
	35.781	0.000
	35.781	0.000
	72.021	13.000

**Change Summary Explanation**

Increase in FY 2020 due to civilian pay repricing adjustment.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>				<b>Project (Number/Name)</b> 666157 / <i>Development Planning</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
666157: <i>Development Planning</i>	-	47.383	25.007	15.533	0.000	15.533	15.830	16.159	16.461	16.768	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Development Planning (DP) project funds activities to analyze Air Force capability needs and requirements to identify potential shortfalls and opportunities; formulate candidate concepts and solution options to address Air Force capability needs and shortfalls; and conduct coordinated analysis and assessment activities to address requirements, technology needs, capability trades, schedule, cost, and pre-systems acquisition planning. Emphasis is placed on activities to inform strategic planning, analyzing multi-domain capabilities that look first at non-materiel solutions before generating materiel needs and requirements.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Title:</b> Future Capability Analyses</p> <p><b>Description:</b> Conduct capability analyses by analyzing warfighter capability needs and requirements to identify potential shortfalls and opportunities.</p> <p>In FY 2019 this effort was named Long-Range Capability Analyses.</p> <p><b>FY 2019 Plans:</b> Identify and assess enduring and future Air Force capability challenges and emerging opportunities that could lead to new warfighting concepts. Develop capability roadmaps, advanced concept studies and analyses, and derive technology needs required to realize future solutions to warfighter capability needs.</p> <p><b>FY 2020 Plans:</b> Continue to identify and assess enduring and future Air Force capability challenges and opportunities. Continue to develop capability roadmaps, advanced concept studies and analyses, and derive technology needs required to realize future solutions to warfighter capability needs.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 increased compared to FY 2019 by \$0.130 million. Justification for the increase is described in the plans above.</p>	4.105	4.739	4.869
<p><b>Title:</b> Concept Development</p> <p><b>Description:</b> Conduct concept development activities to inform strategic investment decisions. Formulate and explore multi-domain options (materiel and non-materiel) to better understand operational decision space.</p> <p><b>FY 2019 Plans:</b></p>	4.082	4.529	4.665

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Formulate and explore multi-domain options (materiel and non-materiel) to better understand operational decision space with a focus on command, control, communications, and computers.  <b>FY 2020 Plans:</b> Continue to formulate and explore multi-domain options (materiel and non-materiel) to better understand operational decision space.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 increased compared to FY 2019 by \$0.136 million. Justification for the increase is described in the plans above.				
<b>Title:</b> Capability Development Strategies  <b>Description:</b> Conduct strategic planning activities that address requirements, schedule, cost, technology, and acquisition strategy.  In FY 2019 this effort was named Pre-systems Acquisition Planning.  <b>FY 2019 Plans:</b> Perform pre-systems acquisition planning activities, including concept refinement, software engineering support, cost estimates, acquisition courses of action, and acquisition milestone documentation.  <b>FY 2020 Plans:</b> Continue to perform pre-systems acquisition planning activities, including concept refinement, cost estimates, acquisition courses of action, and acquisition milestone documentation.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 increased compared to FY 2019 by \$3.260 million. Funding increased due to civilian pay repricing adjustment.		2.956	2.739	5.999
<b>Accomplishments/Planned Programs Subtotals</b>		11.143	12.007	15.533
		<b>FY 2018</b>	<b>FY 2019</b>	
<b>Congressional Add:</b> Program Increase - Air Superiority 2030 Planning for Development  <b>FY 2018 Accomplishments:</b> Conducted Congressionally-directed efforts  <b>FY 2019 Plans:</b> Not Applicable		29.440	0.000	
<b>Congressional Add:</b> Program Increase - Global Strike Command Analytics		6.800	0.000	

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	FY 2018	FY 2019
<b>FY 2018 Accomplishments:</b> Conducted Congressionally-directed efforts		
<b>FY 2019 Plans:</b> Not Applicable		
<b>Congressional Add:</b> Program Increase - Nuclear Modernization Analytics	0.000	8.000
<b>FY 2018 Accomplishments:</b> Not Applicable		
<b>FY 2019 Plans:</b> Conduct Congressionally-directed efforts		
<b>Congressional Add:</b> Program Increase - Nuclear Deterrence Research	0.000	5.000
<b>FY 2018 Accomplishments:</b> Not Applicable		
<b>FY 2019 Plans:</b> Conduct Congressionally-directed efforts		
<b>Congressional Adds Subtotals</b>	36.240	13.000

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

N/A

**Remarks**

**D. Acquisition Strategy**

Not applicable.

**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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<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i>	-	59.263	23.063	47.182	0.000	47.182	51.901	46.075	38.562	27.937	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Integrated Simulation and Analysis project provides a collaborative cross-organizational, multi-domain, holistic enterprise system-of-systems perspective in synthetic environments for modeling, simulation, analysis, and experimentation of systems and concepts under assessment while enabling exploration of innovative materiel and non-materiel alternatives. This effort accomplishes system performance representations/models, environments, architectures, and tools that underpin variable fidelity; stand-alone, interactive, and distributed simulations; and virtual prototyping using an adaptive ecosystem comprised of organizations and capabilities aligned with purpose. Integrated Simulation and Analysis combines real-time and constructive simulations, operators-in-the-loop, experimental and operational software and hardware engineered in synthesized environments to conduct rapid air, space, cyber, and multi-domain warfighting capabilities assessments in support of development planning, experimentation, developmental and operational testing, and training requirements.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Modeling, Simulation, Analysis, and Experimentation Ecosystem	23.482	23.063	17.802
<b>Description:</b> Develop cross-domain system-of-systems modeling, simulation, and analysis capabilities to support development planning, capabilities assessment, and acquisition decisions.			
In FY 2019 this effort was named Integrated Simulation and Analysis.			
<b>FY 2019 Plans:</b> Reconfigure and mature models and tool sets to provide integrated simulation capabilities with variable levels of fidelity and realistic representation of battlespace environments. Begin to mature capabilities into a high-fidelity, multi-platform, multi-domain, operationally representative virtual environment to supplement open air testing. Begin test, validation/verification of models. Provide a core set of composable models and a common suite of cross-domain, reusable frameworks at the engineering, engagement, mission, and campaign levels that can be used to support robust development planning and experimentation for high-priority capability gaps, needs, and warfighting challenges identified by Air Force leadership.			
<b>FY 2020 Plans:</b> Continue to reconfigure and mature models and tool sets to provide integrated simulation capabilities with variable levels of fidelity and realistic representation of battlespace environments. Provide a core set of composable models and a common suite of cross-domain, reusable frameworks at the engineering, engagement, mission, and campaign levels that can be used to support robust			

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
development planning and experimentation for high-priority capability gaps, needs, and warfighting challenges identified by Air Force leadership.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 decreased compared to FY 2019 by \$5.261 million. Funding decreased due to breaking out Joint Simulation Environment and Simulation and Analysis Facility Support into separate efforts for emphasis.				
<b>Title:</b> Joint Simulation Environment (JSE)  <b>Description:</b> Develops a government-owned and operated modeling and simulation capability that enables multi-platform, multi-domain integration and interoperability. This capability is required to support developmental and operational testing, tactics development, and advanced training for 5th Generation platforms and other future capabilities, critical for force development.  <b>FY 2019 Plans:</b> In FY 2019, this work is performed under the Modeling, Simulation, Analysis, and Experimentation Ecosystem effort.  <b>FY 2020 Plans:</b> Design, develop, prototype, and integrate critical JSE components to establish a performance baseline encompassing AF requirements linking 4th, 5th, and 6th Generation systems into a robust environment suitable for test, advanced training, and experimentation.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 increased compared to FY 2019 by \$25.880 million. Funding increased due to realignment of this effort from the Modeling, Simulation, Analysis, and Experimentation Ecosystem effort and increased emphasis in FY 2020 in JSE activities.		0.000	0.000	25.880
<b>Title:</b> Simulation and Analysis Facility Support  <b>Description:</b> Develops real-time, high-fidelity, live virtual constructive modeling, simulation, and analysis capability to evaluate network-enabled warfighting capabilities, strategies, concepts of operation, tactics, emerging technologies, and human system interfaces to support and enable acquisition, test, and training.  <b>FY 2019 Plans:</b> In FY 2019, this work is performed under the Modeling, Simulation, Analysis, and Experimentation Ecosystem effort.  <b>FY 2020 Plans:</b> Develop and update integrated processes, tools, simulation environments, and capabilities to support live virtual constructive modeling, simulation, and analysis with a focus on cross-domain and multi-level security infrastructures as multi-domain		0.000	0.000	3.500

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
operations force multipliers to support analysis, assessment, and experimentation, as well as operational test and training infrastructures.				
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> FY 2020 increased compared to FY 2019 by \$3.500 million. Funding increased due to realignment of this effort from the Modeling, Simulation, Analysis, and Experimentation Ecosystem effort for greater emphasis.				
<b>Accomplishments/Planned Programs Subtotals</b>		23.482	23.063	47.182
		<b>FY 2018</b>	<b>FY 2019</b>	
<b><i>Congressional Add:</i></b> Program Increase - Modeling and Simulation - Joint Simulation Environment		35.781	0.000	
<b><i>FY 2018 Accomplishments:</i></b> Conducted Congressionally-directed efforts				
<b><i>FY 2019 Plans:</i></b> Not Applicable				
<b>Congressional Adds Subtotals</b>		35.781	0.000	
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
Not applicable.				
<b>E. Performance Metrics</b>				
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.				