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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

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|--|---|
| Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i> | R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i> |
|--|---|

| COST (\$ in Millions) | Prior Years | FY 2019 | FY 2020 | FY 2021 Base | FY 2021 OCO | FY 2021 Total | FY 2022 | FY 2023 | FY 2024 | FY 2025 | Cost To Complete | Total Cost |
|---|-------------|---------|---------|--------------|-------------|---------------|---------|---------|---------|---------|------------------|------------|
| Total Program Element | - | 46.145 | 86.715 | 63.381 | 0.000 | 63.381 | 58.847 | 51.505 | 41.128 | 41.886 | Continuing | Continuing |
| 666157: <i>Development Planning</i> | - | 23.082 | 35.533 | 12.049 | 0.000 | 12.049 | 12.842 | 13.012 | 13.245 | 13.490 | Continuing | Continuing |
| 666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i> | - | 23.063 | 51.182 | 51.332 | 0.000 | 51.332 | 46.005 | 38.493 | 27.883 | 28.396 | 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 Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF-P) analytic basis for cost and capability trades driving non-materiel 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 (AFWIC), 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 element 0605831F.

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. Program Change Summary (\$ in Millions) | FY 2019 | FY 2020 | FY 2021 Base | FY 2021 OCO | FY 2021 Total |
|---|----------------|----------------|---------------------|--------------------|----------------------|
| Previous President's Budget | 48.070 | 62.715 | 67.731 | 0.000 | 67.731 |
| Current President's Budget | 46.145 | 86.715 | 63.381 | 0.000 | 63.381 |
| Total Adjustments | -1.925 | 24.000 | -4.350 | 0.000 | -4.350 |
| • Congressional General Reductions | 0.000 | 0.000 | | | |
| • Congressional Directed Reductions | 0.000 | 0.000 | | | |
| • Congressional Rescissions | 0.000 | 0.000 | | | |
| • Congressional Adds | 0.000 | 24.000 | | | |
| • Congressional Directed Transfers | 0.000 | 0.000 | | | |
| • Reprogrammings | 0.000 | 0.000 | | | |
| • SBIR/STTR Transfer | -1.379 | 0.000 | | | |
| • Other Adjustments | -0.546 | 0.000 | -4.350 | 0.000 | -4.350 |

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

| | FY 2019 | FY 2020 |
|---|---------|---------|
| Project: 666157: <i>Development Planning</i> | | |
| Congressional Add: <i>Program Increase - Nuclear Modernization Analytics</i> | 7.772 | 8.000 |
| Congressional Add: <i>Program Increase - Nuclear Deterrence Research</i> | 4.857 | 10.000 |
| Congressional Add: <i>Unfunded Requirement - Development Planning</i> | 0.000 | 2.000 |
| Congressional Add Subtotals for Project: 666157 | 12.629 | 20.000 |
| Project: 666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i> | | |
| Congressional Add: <i>Unfunded Requirement - Integrated Simulation and Analysis</i> | 0.000 | 4.000 |
| Congressional Add Subtotals for Project: 666158 | 0.000 | 4.000 |
| Congressional Add Totals for all Projects | 12.629 | 24.000 |

Change Summary Explanation

Decrease in FY 2021 due to civilian pay reprice adjustments.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

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| Appropriation/Budget Activity 3600 / 6 | R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i> | Project (Number/Name) 666157 / <i>Development Planning</i> |
|--|---|--|

| COST (\$ in Millions) | Prior Years | FY 2019 | FY 2020 | FY 2021 Base | FY 2021 OCO | FY 2021 Total | FY 2022 | FY 2023 | FY 2024 | FY 2025 | Cost To Complete | Total Cost |
|-------------------------------------|-------------|---------|---------|--------------|-------------|---------------|---------|---------|---------|---------|------------------|------------|
| 666157: <i>Development Planning</i> | - | 23.082 | 35.533 | 12.049 | 0.000 | 12.049 | 12.842 | 13.012 | 13.245 | 13.490 | 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 and operational experimentation, analyzing multi-domain capabilities that look first at non-materiel solutions before generating materiel needs and requirements.

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

| | FY 2019 | FY 2020 | FY 2021 |
|---|---------|---------|---------|
| <p>Title: Future Capability Analyses</p> <p>Description: Conduct capability analyses by analyzing warfighter capability needs and requirements to identify potential shortfalls and opportunities.</p> <p>FY 2020 Plans: Continue to identify and assess enduring and future Air Force capability challenges and opportunities. Continue to develop advanced concept studies and analyses, and derive operational and technology needs required to realize future solutions to warfighter capability needs.</p> <p>FY 2021 Plans: Based on the Air Force Warfighting Integration Capability (AFWIC)-developed Air Force Design, continue to assess enduring and future Air Force capability challenges and emerging opportunities that could lead to new warfighting concepts as identified by Air Force cross functional teams. Develop advanced concept studies and analyses, and derive operational and technology needs required to realize future solutions to warfighter capability needs.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 decreased compared to FY 2020 by \$0.711 million. Funding decreased due to civilian pay reprice adjustments.</p> | 3.924 | 4.869 | 4.158 |
| <p>Title: Concept Development</p> <p>Description: 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>FY 2020 Plans:</p> | 3.759 | 4.665 | 3.841 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force | | Date: February 2020 | | |
| Appropriation/Budget Activity 3600 / 6 | R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i> | Project (Number/Name) 666157 / <i>Development Planning</i> | | |
| B. Accomplishments/Planned Programs (\$ in Millions) | | FY 2019 | FY 2020 | FY 2021 |
| Continue to formulate and explore multi-domain options (materiel and non-materiel) to better understand operational decision space. FY 2021 Plans: Develop advanced concept studies and analyses, and derive operational and technology needs required to realize future solutions to warfighter capability needs. FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 decreased compared to FY 2020 by \$0.824 million. Funding decreased due to civilian pay reprice adjustments. | | | | |
| Title: Capability Development Strategies Description: Conduct strategic planning activities that address requirements, schedule, cost, technology, and acquisition strategy. FY 2020 Plans: Continue to perform pre-systems acquisition planning activities, including concept refinement, cost estimates, acquisition courses of action, and acquisition milestone documentation. FY 2021 Plans: Continue to perform pre-systems acquisition planning activities, including concept refinement, cost estimates, acquisition courses of action, and acquisition milestone documentation. FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 decreased compared to FY 2020 by \$1.949 million. Funding decreased due to civilian pay reprice adjustments. | | 2.770 | 5.999 | 4.050 |
| Accomplishments/Planned Programs Subtotals | | 10.453 | 15.533 | 12.049 |
| | | FY 2019 | FY 2020 | |
| Congressional Add: Program Increase - Nuclear Modernization Analytics FY 2019 Accomplishments: Conducted Congressionally-directed efforts FY 2020 Plans: Conduct Congressionally-directed efforts | | 7.772 | 8.000 | |
| Congressional Add: Program Increase - Nuclear Deterrence Research FY 2019 Accomplishments: Conducted Congressionally-directed efforts FY 2020 Plans: Conduct Congressionally-directed efforts | | 4.857 | 10.000 | |
| Congressional Add: Unfunded Requirement - Development Planning | | 0.000 | 2.000 | |

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| Appropriation/Budget Activity 3600 / 6 | R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i> | Project (Number/Name) 666157 / <i>Development Planning</i> |
|--|---|--|

| | FY 2019 | FY 2020 |
|--|---------|---------|
| FY 2019 Accomplishments: Not Applicable | | |
| FY 2020 Plans: Conduct Congressionally-directed efforts | | |
| Congressional Adds Subtotals | 12.629 | 20.000 |

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

N/A

Remarks

D. Acquisition Strategy

Not applicable.

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| Appropriation/Budget Activity 3600 / 6 | | | | | R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i> | | | | Project (Number/Name) 666158 / <i>INTEGRATED SIMULATION AND ANALYSIS</i> | | | |
| COST (\$ in Millions) | Prior Years | FY 2019 | FY 2020 | FY 2021 Base | FY 2021 OCO | FY 2021 Total | FY 2022 | FY 2023 | FY 2024 | FY 2025 | Cost To Complete | Total Cost |
| 666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i> | - | 23.063 | 51.182 | 51.332 | 0.000 | 51.332 | 46.005 | 38.493 | 27.883 | 28.396 | 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)

| | FY 2019 | FY 2020 | FY 2021 |
|--|----------------|----------------|----------------|
| Title: Modeling, Simulation, Analysis, and Experimentation Ecosystem | 23.063 | 17.802 | 17.349 |
| Description: Develop cross-domain system-of-systems modeling, simulation, and analysis capabilities to support development planning, capabilities assessment, and acquisition decisions. | | | |
| FY 2020 Plans: Continue support of integrated simulation capabilities, with models and tools that represent varying 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 development planning and experimentation for high-priority capability gaps, needs, and warfighting challenges identified by Air Force leadership. | | | |
| FY 2021 Plans: Continue to reconfigure and mature a modeling, simulation and analysis infrastructure to include models/tool sets, data management/exchange mechanisms, analytic cadre, organizational relationships and analytical methods 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, campaign, and Air Force enterprise system-of-system levels that can be used to support robust development planning and experimentation for high-priority capability gaps, needs, exploration and warfighting challenges identified by Air Force leadership. | | | |
| FY 2020 to FY 2021 Increase/Decrease Statement: | | | |

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| B. Accomplishments/Planned Programs (\$ in Millions) | | FY 2019 | FY 2020 | FY 2021 |
| FY 2021 decreased compared to FY 2020 by \$0.453 million. Funding decreased due to civilian pay reprice adjustments. | | | | |
| <p>Title: Joint Simulation Environment (JSE)</p> <p>Description: 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.</p> <p>FY 2020 Plans: Design, develop, prototype, and integrate critical JSE components to establish a performance baseline encompassing Air Force requirements linking 4th-, 5th-, and 6th-generation systems into a robust environment suitable for test, advanced training, and experimentation.</p> <p>FY 2021 Plans: Continue prototyping and integrate critical JSE components into the baseline encompassing Air Force requirements linking 4th-, 5th-, and 6th-generation systems into a robust environment suitable for test, advanced training, and experimentation. Integrate additional modeling capabilities for electronic warfare, weapons, and space into the baseline to enable integrated testing in a simulated environment.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 increased compared to FY 2020 by \$4.603 million. Funding increased due to the integration of additional modeling capabilities.</p> | | 0.000 | 25.880 | 30.483 |
| <p>Title: Simulation and Analysis Facility Support</p> <p>Description: 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.</p> <p>FY 2020 Plans: 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 operations force multipliers to support analysis, assessment, and experimentation, as well as operational test and training infrastructures.</p> <p>FY 2021 Plans: Continue to develop upgrades and 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-</p> | | 0.000 | 3.500 | 3.500 |

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| B. Accomplishments/Planned Programs (\$ in Millions) | | FY 2019 | FY 2020 | FY 2021 |
| domain operations force multipliers to support analysis, assessment, and experimentation, as well as operational test and training infrastructures. | | | | |
| FY 2020 to FY 2021 Increase/Decrease Statement: Not applicable. | | | | |
| Accomplishments/Planned Programs Subtotals | | 23.063 | 47.182 | 51.332 |
| | | FY 2019 | FY 2020 | |
| Congressional Add: Unfunded Requirement - Integrated Simulation and Analysis | | 0.000 | 4.000 | |
| FY 2019 Accomplishments: Not applicable | | | | |
| FY 2020 Plans: Conduct Congressionally-directed efforts | | | | |
| Congressional Adds Subtotals | | 0.000 | 4.000 | |
| C. Other Program Funding Summary (\$ in Millions) | | | | |
| N/A | | | | |
| Remarks | | | | |
| D. Acquisition Strategy | | | | |
| Not applicable. | | | | |