| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Office of the Secretary Of Defense | Date: February 2019 |
|---|---|
| **Appropriation/Budget Activity**<br>0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)* | **R-1 Program Element (Number/Name)**<br>PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments* |

| 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 | 39.047 | 12.658 | 18.430 | 19.429 | - | 19.429 | 19.661 | 19.951 | 20.267 | 20.697 | Continuing | Continuing |
| 328: *Science and Technology Analytic Assessments* | 39.047 | 12.658 | 18.430 | 19.429 | - | 19.429 | 19.661 | 19.951 | 20.267 | 20.697 | Continuing | Continuing |

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

This Program Element (PE) directly supports Strategic Intelligence Analysis Cell (SIAC) for the Office of the Under Secretary of Defense, Research and Engineering (OUSD(R&E)) with assessments and analysis to inform the strategic direction of research, development, and acquisition of innovative capabilities to meet the emerging threats from the diverse range of state and non-state actors confronting the Unites States. The analysis uses the operational context of Joint and cross-domain missions by leveraging Combatant Commands (COCOM) and Joint Staff warfighting concepts. Throughout this process the analysis will be tightly coupled with both the Intelligence community and the operational community through the COCOM.

Analysis and assessments are focused on challenges related to the National Defense Strategy objectives and adversary research and development trends. Three analysis methods are used: 1) Operational and Technical Assessments identify gaps and options to fill those gaps; 2) Technical Analysis quantifies key attributes of the challenge, assess counter technology options, and provide an operational value assessment; and 3) the Quick Reaction Analysis Team provides quick turn analysis on emerging challenges and senior leader issues using the Federally Funded Research and Development Center/University Affiliated Research Center (FFRDC/UARC) community as performers while leveraging previous related experience and work done for the Department of Defense (DoD). Due to the complexity of these challenges, the process for developing and executing analytic assessments can span fiscal years and may have multiple phases.

| B. Program Change Summary ($ in Millions) | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 13.154 | 19.472 | 19.485 | - | 19.485 |
| Current President's Budget | 12.658 | 18.430 | 19.429 | - | 19.429 |
| Total Adjustments | -0.496 | -1.042 | -0.056 | - | -0.056 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.471 | - | | | |
| • FFRDC Reduction | -0.025 | -0.042 | - | - | - |
| • Other Program Adjustments | - | - | -0.056 | - | -0.056 |
| • Congressional Reduction | - | -1.000 | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2020 Office of the Secretary Of Defense | | | Date: February 2019 |
|---|---|---|---|
| Appropriation/Budget Activity<br>0400 / 3 | R-1 Program Element (Number/Name)<br>PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments* | Project (Number/Name)<br>328 / *Science and Technology Analytic Assessments* | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 328: *Science and Technology Analytic Assessments* | 39.047 | 12.658 | 18.430 | 19.429 | - | 19.429 | 19.661 | 19.951 | 20.267 | 20.697 | Continuing | Continuing |

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

The Science and Technology (S&T) Analytic Assessments Program Element (PE) directly shapes the development of innovative capabilities to meet the emerging threats from the diverse range of state and non-state actors confronting the Unites States. These areas include: space and terrestrial-based indications and warnings systems, integrated and resilient Intelligence, Surveillance, Reconnaissance (ISR) platforms, strategic lift, long-range precision strike weapons, missile defense technologies, undersea systems, remotely operated vehicles and technologies, special operations forces, the Cyber Mission Force, ground systems, and others outlined in the 2018 National Defense Strategy. Due to the complexity of these challenges, the process for developing and executing these analytic assessments span fiscal years and may have multiple phases. The emerging nature of the problem sets makes specific identification of all the study projects beyond the budget year unlikely. Implementation of this process spans multiple years causing the portfolio to cascade from year-to-year.

Operational and Technical Assessments are informed by comprehensive Kill Chain Analysis (KCA) across all domains and the time continuum from 2020-2040 to identify prioritized operational issues and associated actionable technology focus areas. These products support detailed analyses and assessments to help shape technology investment decisions and inform the strategic direction of capability development. Because of the 20 year timeframe, these analyses will also help to inform requirements rather than waiting for current processes to develop them. Main lines of effort include the following activities:
- KCA across Defense Planning Scenarios and other relevant DoD Vignette to identify and characterize capability disadvantages and opportunities across the battlespace.
- Develop and maintain an all source-like database of military capabilities and a standalone software application, KCA Results Display System, to provide data and analysis on operational issues.
- Produce operational impact assessments of potential technology improvements to military capabilities in the near, mid, and far term.
- Consolidate Technology focused roadmaps of U.S. capability development and S&T developmental strategic plans.

Technical Analysis and Quick Reaction Analysis Team perform engineering level systems analysis using the DoD sponsored FFRDC/UARC and Department of Defense and Department of Energy (DoD/DoE) laboratories. Using these research performers, previously sponsored research on relevant topics is leveraged in the new research providing value and experience on new projects. Main lines of effort include the following activities:
- Technical threat assessments building on intelligence community products for identifying gaps in U.S. capability for critical threats.
- Quantitative analysis of potential new technology and concepts to address capability gaps and counter emerging threat technologies.
- Architecture development and evaluation to develop new U.S. capability.
- Independent assessment of critical capability and technology development.

Analytic Tools include modeling, simulation, and analysis (MS&A), computer based engineering models, and purposed designed equipment to demonstrate or confirm theoretical performance of technical concepts. Main lines of effort include the following activities:

| Exhibit R-2A, RDT&E Project Justification: PB 2020 Office of the Secretary Of Defense | | Date: February 2019 |
|---|---|---|
| **Appropriation/Budget Activity**<br>0400 / 3 | **R-1 Program Element (Number/Name)**<br>PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments* | **Project (Number/Name)**<br>328 / *Science and Technology Analytic Assessments* |

- Develop analytic tools to inform and provide decision support to resourcing recommendations.
- Develop strategic analytic tools enabling the analysis and evaluation of critical capability and technology development.
- Integrated MS&A leveraging Service- and Agency–level virtual and constructive resources to provide insight into complex acquisition and operational decisions.
- Red Teaming existing and planned U.S. capabilities and weapons systems using emerging threat systems and capabilities in emerging scenarios.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2018 | FY 2019 | FY 2020 |
|---|---|---|---|
| ***Title:*** Science and Technology Analytic Assessments | 12.658 | 18.430 | 19.429 |

***Description:*** Science and Technology (S&T) Analytic Assessments Program Element (PE) directly supports the development of innovative capabilities to meet the emerging threats from the diverse range of state and non-state actors confronting the Unites States. These capabilities support the objective in the 2018 National Defense Strategy and include: space and terrestrial-based indications and warnings systems, integrated and resilient Intelligence, Surveillance, Reconnaissance (ISR) platforms, strategic lift, long-range precision strike weapons, missile defense technologies, undersea systems, remotely operated vehicles and technologies, special operations forces, the Cyber Mission Force, ground systems, and others outlined in the 2015 National Military Strategy. Throughout this process the analysis will be tightly coupled with both the Intelligence community and the operational community through the Combatant Commands.
Accordingly, the following activities are planned for FY 2019 and FY 2020.

***FY 2019 Plans:***
Operational and Technical Assessments:
Specific tasks that will be executed within the Kill Chain Analysis (KCA) area include:
- Conduct KCA on new threat scenarios and projected threat capabilities.
- Assess emerging operational scenarios against future red and blue capability timelines.
- Update existing KCA based on emerging red and blue capability assessments.
- Develop and maintain technology development road maps conveying a comprehensive picture of U.S. technology development.

Quick Reaction Analysis Team (QRAT):
Quick Reaction Analytic efforts responding to critical questions related to potential vulnerabilities in current and future U.S. systems to identify opportunities or challenges related to developing foreign capabilities. These short studies typically focus on the following capability areas: foreign, integrated air and missile defense capabilities; options for U.S. electronic warfare and capability to counter adversaries; resiliency in U.S. Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems and options to counter adversaries C4ISR capabilities; ground combat offensive and defensive capabilities, air dominance and missile defense, and undersea engagements. The QRAT is enabled by a weekly meeting of FFRDC/UARC lead contacts to review on-going and emerging tasks and collaborative technical interchanges on OUSD(R&E) focus areas.

Engineering Analysis (Strategic Studies):

| Exhibit R-2A, RDT&E Project Justification: PB 2020 Office of the Secretary Of Defense | | Date: February 2019 |
|---|---|---|
| **Appropriation/Budget Activity**<br>0400 / 3 | **R-1 Program Element (Number/Name)**<br>PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments* | **Project (Number/Name)**<br>328 / *Science and Technology Analytic Assessments* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2018 | FY 2019 | FY 2020 |
|---|---|---|---|
| Strategic studies are 6-12 month engineering level systems analysis. Strategic studies parametrically define the emerging threat space, determine feasibility of potential solutions and parametrically analyze the solution trade space. Specific tasks that will be executed within the strategic studies area include:<br>- Explore feasibility and potential of next generation electronic warfare technologies.<br>- Analyze potential components of a theater-level electronic warfare threat awareness and battle management architecture.<br>- Evaluate options to increase survivability of US weapons against advanced Integrated Air Defense System (IADS) and counter-measures<br>- Identify and evaluate countermeasures to adversary smart weapons.<br>- Identify and evaluate potential technologies' to aid tracking and communications for underwater operations.<br><br>Analytic tool development<br>- Develop analytic tools to inform and evaluate new technologies' potential to counter emerging threats and exploit adversary vulnerabilities from air, land, sea, and space domains.<br>- Develop analytic tools to provide inform and provide decision support to resourcing recommendations.<br>- Develop integrated modeling, simulation, and analysis tools to aid complex acquisition decisions.<br>- Red Team U.S. capabilities and systems in the context of emerging threats in relevant scenarios. | | | |
| ***FY 2020 Plans:***<br>Operational and Technical Assessments:<br>Specific tasks that will be executed within the Kill Chain Analysis (KCA) area include:<br>- Conduct KCA on new threat scenarios and projected threat capabilities.<br>- Assess emerging operational scenarios against future red and blue capability timelines.<br>- Update existing KCA based on emerging red and blue capability assessments.<br>- Develop and maintain technology development road maps conveying a comprehensive picture of U.S .technology development.<br>- Explore the optimization of hypersonic technology in the US offensive and defensive arsenal through operational impact and cost benefit analysis across all relevant operational scenarios.<br>Quick Reaction Analysis Team (QRAT):<br>Quick Reaction Analytic efforts respond to critical questions related to potential vulnerabilities in current and future U.S. systems to identify opportunities or challenges related to developing foreign capabilities. These short studies focus on emerging technology areas, emerging threat capability development, U.S. requirements to meet challenges and topical questions from USD(R&E) senior leadership.<br><br>Engineering Analysis (Strategic Studies): | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2020 Office of the Secretary Of Defense | | Date: February 2019 |
|---|---|---|
| **Appropriation/Budget Activity**<br>0400 / 3 | **R-1 Program Element (Number/Name)**<br>PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments* | **Project (Number/Name)**<br>328 / *Science and Technology Analytic Assessments* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2018 | FY 2019 | FY 2020 |
|---|---|---|---|
| Strategic studies are 6-12 month engineering level systems analysis. Strategic studies parametrically define the emerging threat space, determine feasibility of potential solutions and parametrically analyze the solution trade space. Specific tasks that will be executed within the strategic studies area include:<br>- Explore the feasibility and trade space options for Joint, fully networked command control and communications capabilities across domains.<br>- Identify the early applications for artificial intelligence and autonomous systems to address national defense challenges.<br>- Explore the feasibility and trade space options for countering adversary's emerging intelligence, surveillance and reconnaissance capabilities.<br>- Explore feasibility and potential early applications of directed energy for offensive and defense capabilities.<br>- Analyze the trade space of Geostationary Earth Orbit (GEO), Medium Earth Orbit (MEO), and Low Earth Orbit (LEO) capabilities in the context of operational impact, resiliency, affordability, and time to orbit.<br><br>Analytic tool development<br>- Develop analytic tools to inform and evaluate new technologies' potential to counter emerging threats and exploit adversary vulnerabilities from air, land, sea, and space domains.<br>- Develop analytic tools to provide inform and provide decision support to resourcing recommendations.<br>- Develop integrated modeling, simulation, and analysis tools to aid complex acquisition decisions.<br>Red Team U.S. capabilities and systems in the context of emerging threats in relevant scenarios.<br>***FY 2019 to FY 2020 Increase/Decrease Statement:***<br>Inflation Adjustment. | | | |
| **Accomplishments/Planned Programs Subtotals** | 12.658 | 18.430 | 19.429 |

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

- Critical gaps in U.S. capability are identified and published in an annual capstone document.
- U.S. technology development is documented in comprehensive road maps and capability development gaps are identified.
- Potential solutions for capability development gaps are identified and assessed measured against the operational impact and technical feasibility

| Exhibit R-2A, RDT&E Project Justification: PB 2020 Office of the Secretary Of Defense | | Date: February 2019 |
|---|---|---|
| **Appropriation/Budget Activity**<br>0400 / 3 | **R-1 Program Element (Number/Name)**<br>PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments* | **Project (Number/Name)**<br>328 / *Science and Technology Analytic Assessments* |

- New architectures and evaluation criteria for developing U.S. capability are identified and assessed for operational and technical trade space options.