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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>
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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	-	5.568	5.672	4.320	0.000	4.320	5.882	5.986	6.092	3.708	Continuing	Continuing
64536A: <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>	-	4.421	4.503	3.132	0.000	3.132	4.669	4.751	4.835	2.428	Continuing	Continuing
64537A: <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>	-	1.147	1.169	1.188	0.000	1.188	1.213	1.235	1.257	1.280	Continuing	Continuing

A. Mission Description and Budget Item Justification

Intelligence Advanced Development (IAD) develops and demonstrates technology required to support warfighter needs for timely all source intelligence information. IAD supports global awareness, consistent battlespace knowledge, precision information, and the execution of time critical missions. IAD focuses on enhancing defense intelligence capabilities through exploration and development of innovative tools including data analytics for mining and exploitation, machine-learning, and software automation. IAD projects provide improved on-time information to the warfighter using new and existing data sources, streamlining data analysis, thus reducing the footprint required, and enhancing performance. These support the Anti-Access/Area Denial (A2/AD) Contested/Congested Degraded Operations (CDO) problem set. The Air Force Research Lab, Rome Research Site, Information Intelligence Systems and Analysis Division (AFRL/RIE), works directly with users, employing evolutionary approaches and integrating finished modules directly into the field. The programs are oriented toward specific shortfalls and deficiencies as documented by the Major Commands (MAJCOMs), Unified Commands, and intelligence organizations in their mission and functional area plans. This PE expedites technology transition from the laboratory to operational users via rapid prototyping. It is focused on technology insertion to correct AF intelligence deficiencies at the tactical and operational levels. The PE bridges the transition of new technologies from Advance Technology Demonstrations (ATDs) and Integrated Technology Thrust Programs (ITTPs) into current/new systems, and supports the associated Defense Technology Objectives (DTOs). IAD may also reallocate existing resources to support out-of-cycle new/ updated warfighter requirements.

Requirements for this PE are identified and prioritized by Air Combat Command (ACC). Development of new/improved capabilities to meet the requirements are managed by AFRL/RIE. Prototype products, usually in the form of software, are provided to users in incremental capability spirals for operational environment evaluation.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Intelligence Advanced Development capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>
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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	5.568	5.672	5.770	0.000	5.770
Current President's Budget	5.568	5.672	4.320	0.000	4.320
Total Adjustments	0.000	0.000	-1.450	0.000	-1.450
• 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	-1.450	0.000	-1.450

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Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>				Project (Number/Name) 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</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
64536A: <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>	-	4.421	4.503	3.132	0.000	3.132	4.669	4.751	4.835	2.428	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The mission is to develop prototypes which encompass several areas of intelligence exploitation including the advancement of all source correlation and fusion for the intelligence analyst. Projects include development of innovative data analytics, machine-learning, and automated software tools. The intent is to enhance the overall situational awareness for Air Force, DoD, and Coalition groups which have requirements to correlate various sources of intelligence information, including Communications Intelligence (COMINT), Electronics Intelligence (ELINT), Imagery Intelligence (IMINT), Geospatial Intelligence (GEOINT), Measurement and Signature Intelligence (MASINT), Signals Intelligence (SIGINT), Publicly Available Information (PAI) and others, in a timely manner. IET may reallocate existing resources to support out-of-cycle new/updated warfighter requirements.

The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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

	FY 2019	FY 2020	FY 2021
Title: Intelligence Exploitation Tools (IET)	4.421	4.503	3.132
Description: IET addresses the accurate and timely interpretation of various Intelligence data sources (such as digital imagery, video, documents, signals) by developing and evaluating methods to index, exploit, and manipulate disparate data products using analytics, machine-learning, and software automation. This provides the analyst with the ability to rapidly search and fuse multiple intelligence sources for improved situational awareness and to better detect anomalies. Cross domain tools enable data exploitation at multiple classification levels. In addition, methods to improve analysis of current and future foreign weapon systems are developed. IET provides enhanced warning and accuracy to allow national and military authorities a greater range of options to avert, diminish or control a crisis.			
FY 2020 Plans:			
- Completing development of software focused on improving the way computers and application services supports intelligence analysts through the use of cognitive systems			
- Completing the development of automated methods that aid in the systematic, continuous, and comprehensive assessment of technical topic, concepts and emergence using information found in the published scientific, technical and patent literature, message traffic, gray literature, and conference papers			

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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>	Project (Number/Name) 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Completing the enabling of Distributed Common Ground Station (DCGS) enterprise support of high-altitude SIGINT missions and execution on NSANet - Complete development of software capability to exploit and fuse Publicly Available Information w/ DCGS related sources - Development of a Feature Extractor to assist automation of Tech ELINT screening - Development and integration of space based modeling capabilities into the Integrated Many on Many (IMOM) mission planning tool - Continue implementation of operational metadata capability for DCGS SIGINT collection systems - Developing Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset - Developing automated artificial intelligent systems and modeling and simulation tools for understanding and visualizing patterns of life, for detecting vulnerabilities in weapon systems, and for the analysis of targets from multi-INT data in various threat environments - Developing multi-INT entity resolution capabilities, utilizing cataloged repositories, which will enable analysts to apply automated machine intelligence and prediction tools to identify trends and mission statistics for SIGINT and DCGS users - Adding automation to a live PED tasking order workflow by ingesting mission data, flying schedules, & authorized service interruptions, enabling user-defined rolls that allow mission change requests & verification of mission changes to occur between C2 node & PED sites prior to final publication & sharing with the larger community - Conduct user evaluations and prototype releases <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Will complete development and integration of space based modeling capabilities into the Integrated Many on Many (IMOM) mission planning tool - Will continue implementation of operational metadata capability for DCGS SIGINT collection systems 				

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>- Will continue Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset</p> <p>- Will develop automated artificial intelligent systems and modeling and simulation tools for understanding and visualizing patterns of life, for detecting vulnerabilities in weapon systems, and for the analysis of targets from multi-INT data in various threat environments</p> <p>- Will develop multi-INT entity resolution capabilities, utilizing cataloged repositories, which will enable analysts to apply automated machine intelligence and prediction tools to identify trends and mission statistics for SIGINT and DCGS users</p> <p>- Will add automation to a live PED tasking order workflow by ingesting mission data, flying schedules, & authorized service interruptions, enabling user-defined rolls that allow mission change requests & verification of mission changes to occur between C2 node & PED sites prior to final publication & sharing with the larger community</p> <p>- Will continue user evaluations and prototype releases</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Minor increase supporting final prototype evaluations</p>				
Accomplishments/Planned Programs Subtotals		4.421	4.503	3.132
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
Requirements for new/improved techniques for operational employment of simulation models are identified and prioritized by ACC. Development of the new/improved capabilities to meet these requirements is managed by Air Force Research Laboratory (AFRL) Rome Research Site. Prototype products (usually software), once evaluated by the users, are transitioned from the laboratory to the operational community in spirals. All major contracts within this project are awarded after full and open competition.				

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025											
	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								
IET																																				
IET Development																																				
Software to improve support to intelligence analysts through cognitive systems																																				
Automated methods for assessment of technical topics, concepts, and emergence																																				
DCGS enterprise support to high-altitude SIGINT missions																																				
Exploit and fuse Publicly Available Information with DCGS related sources																																				
Feature Extractor to assist automation in Tech ELINT																																				
Space based modeling capabilities into IMOM mission planning tool																																				
Operational metadata capability for DCGS SIGINT collection systems																																				
Multi INT data mining tools for patterns of life & weapon sys vulnerabilities																																				
FY19 IET User Evaluations & Prototype Releases																																				
FY20 IET User Evaluations & Prototype Releases																																				
FY21 IET User Evaluations & Prototype Releases																																				
FY22 IET User Evaluations & Prototype Releases																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>	Project (Number/Name) 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>IET</i>				
IET Development	1	2019	4	2025
Software to improve support to intelligence analysts through cognitive systems	1	2019	4	2019
Automated methods for assessment of technical topics, concepts, and emergence	1	2019	4	2019
DCGS enterprise support to high-altitude SIGINT missions	1	2019	4	2021
Exploit and fuse Publicly Available Information with DCGS related sources	1	2019	4	2019
Feature Extractor to assist automation in Tech ELINT	1	2019	4	2020
Space based modeling capabilities into IMOM mission planning tool	1	2019	4	2020
Operational metadata capability for DCGS SIGINT collection systems	1	2019	4	2020
Multi INT data mining tools for patterns of life & weapon sys vulnerabilities	3	2019	4	2021
FY19 IET User Evaluations & Prototype Releases	1	2019	4	2019
FY20 IET User Evaluations & Prototype Releases	1	2020	4	2020
FY21 IET User Evaluations & Prototype Releases	1	2021	4	2021
FY22 IET User Evaluations & Prototype Releases	1	2022	4	2022
FY23 IET User Evaluations & Prototype Releases	1	2023	4	2023
FY24 IET User Evaluations & Prototype Releases	1	2024	4	2024
FY25 IET User Evaluations & Prototype Releases	1	2025	4	2025

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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
64537A: <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>	-	1.147	1.169	1.188	0.000	1.188	1.213	1.235	1.257	1.280	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The mission is to provide continuing development and upgrades of threat analysis capabilities to produce integrated, predictive air and space intelligence to enable military operations, force modernization decisions, and policy making. Products from IAC allow the Intelligence Analyst to accelerate and increase the accuracy of threat estimates and system descriptions to deployed operational forces. Each of the development projects within the IAC program portfolio transition technologies to the operational communities through the incremental release of upgraded versions over a period of years as development projects progress towards the final configuration. IAC may reallocate existing resources to support out-of-cycle new/ updated warfighter requirements.

The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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

	FY 2019	FY 2020	FY 2021
Title: Intelligence Analysis Capabilities (IAC) Development	1.147	1.169	1.188
Description: IAC develops tools and algorithms for Intelligence Analysts with the ability to produce accurate, predictive, relevant, and timely intelligence that supports client processes, operational planning, and mission execution. Methods include data analytics techniques, machine-learning, and software automation. IAC develops new and upgraded analysis, modeling and simulation tools focused on intelligence production supporting AF operational and developmental all source analysis functions.			
FY 2020 Plans:			
- Development of a query class prototype system that will enable users to search large volumes of disparate multimodal and multilingual data sources; this service will be accessible for use by DoD and Intelligence Community (IC) cloud service architectures			
- Development of a prototype Modeling and Simulation tool to address the need for improved threat Integrated Air Defense (IADS) passive detection/tracking and combat identification			
- Development Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Development of a prototype for providing improved Electronic Warfare (EW) information to operational users by leveraging the capabilities of the modernized, national EW databases; this will include signal identification, waveform ambiguity detection and emitter descriptions across all three national EW databases - Development of a machine learning (ML) collaboration & deployment framework for AF DCGS; provide intel ops with an intuitive environment that simplifies deployment/sharing of ML algorithms/models & operational intel datasets - User evaluations and prototype releases <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Will continue development of a query class prototype system that will enable users to search large volumes of disparate multimodal and multilingual data sources; this service will be accessible for use by DoD and Intelligence Community (IC) cloud service architectures - Will continue development of a prototype Modeling and Simulation tool to address the need for improved threat Integrated Air Defense (IADS) passive detection/tracking and combat identification - Will continue development Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset - Will continue development of a prototype for providing improved Electronic Warfare (EW) information to operational users by leveraging the capabilities of the modernized, national EW databases; this will include signal identification, waveform ambiguity detection and emitter descriptions across all three national EW databases - Will continue development of a machine learning (ML) collaboration & deployment framework for AF DCGS; provide intel ops with an intuitive environment that simplifies deployment/sharing of ML algorithms/models & operational intel datasets - Will continue user evaluations and prototype releases <p>FY 2020 to FY 2021 Increase/Decrease Statement: Minor increase to support user evaluations</p>				
Accomplishments/Planned Programs Subtotals		1.147	1.169	1.188

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

N/A

Remarks

D. Acquisition Strategy

Requirements of new/upgraded intelligence analysis tools are identified and prioritized by the ACC. Development of capabilities to meet these requirements is managed by AFRL Rome Research Site. Prototype products (usually software), once evaluated by the users, are fielded in incremental capability spirals. All major contracts within this project are awarded after full and open competition.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
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

IAC	
IAC Development	
Query class system to search large volumes of multimodal / multilingual sources	
Modeling and Simulation for improved IADS passive detection/tracking and combat ID	
Mobile C4 database and visualization for intelligence operators	
Improved EW information by leveraging capabilities of modernized national EW databases	
Framework for sharing machine learning algorithms/models & operational intel datasets	
FY19 IAC User Evaluations & Prototype Releases	
FY20 IAC User Evaluations & Prototype Releases	
FY21 IAC User Evaluations & Prototype Releases	
FY22 IAC User Evaluations & Prototype Releases	
FY23 IAC User Evaluations & Prototype Releases	
FY24 IAC User Evaluations & Prototype Releases	
FY25 IAC User Evaluations & Prototype Releases	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
IAC				
IAC Development	1	2019	4	2025
Query class system to search large volumes of multimodal / multilingual sources	1	2019	4	2021
Modeling and Simulation for improved IADS passive detection/tracking and combat ID	1	2019	4	2021
Mobile C4 database and visualization for intelligence operators	1	2019	4	2021
Improved EW information by leveraging capabilities of modernized national EW databases	1	2019	4	2020
Framework for sharing machine learning algorithms/models & operational intel datasets	2	2019	4	2020
FY19 IAC User Evaluations & Prototype Releases	1	2019	4	2019
FY20 IAC User Evaluations & Prototype Releases	1	2020	4	2020
FY21 IAC User Evaluations & Prototype Releases	1	2021	4	2021
FY22 IAC User Evaluations & Prototype Releases	1	2022	4	2022
FY23 IAC User Evaluations & Prototype Releases	1	2023	4	2023
FY24 IAC User Evaluations & Prototype Releases	1	2024	4	2024
FY25 IAC User Evaluations & Prototype Releases	1	2025	4	2025