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 0305022F *I ISR Modernization & Automation Dvmt (IMAD)* | | | | | | |

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	19.000	0.000	19.000	19.300	19.200	19.300	19.400	Continuing	Continuing
675197: *Core Technology*	-	0.000	0.000	16.000	0.000	16.000	16.000	16.000	16.000	16.000	Continuing	Continuing
675306: *Analysis Enterprise*	-	0.000	0.000	3.000	0.000	3.000	3.300	3.200	3.300	3.400	Continuing	Continuing

Note
 This program, BA 7, PE 0305022F, project 675197, Algorithmic Warfare, is a new start.
 This program, BA 7, PE 0305022F, project 675306, Kill Chain Automation, is a new start.

A. Mission Description and Budget Item Justification

(U) AF ISR must adapt large data sets and condition it into mission sets, allowing personnel to discover, manage, and analyze data and transform it into living intelligence. Kill Chain Automation applies new methodologies; advances automation and machine learning; ensures data is accessible, agreeable, and interoperable; and delivers decision advantage.

(U//FOUO) Algorithmic Warfare encompasses efforts to develop, employ, or field artificial intelligence, automation, machine learning, deep learning, and computer vision algorithms. This critical shift to the digital age will transition ISR analysis from the "what" to the "why" of analysis via human-machine teaming. Algorithmic Warfare can provide world-class ISR support to Joint Operations at the scale and speed required in modern warfare against our adversaries.

(U//FOUO) Algorithmic Warfare reshapes current sense, identify, attribute, share (SIAS, previously known as PED - processing, exploitation, and dissemination) models because the current models will be unsustainable and ineffective in developing ISR digital solutions to find efficiencies and thrive in a complex operating environment. This funding is a first step to address ISR analysts' struggles with data overload; they currently spend 80 percent of their time searching for data and 20 percent of their time making sense of the information.

(U) Supports National Defense Strategy priority of operating at the "speed of relevance."

(U) Supports Next Generation ISR Dominance Flight Plan.

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 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.

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 0305022F *I ISR Modernization & Automation Dvmt (IMAD)*		

B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	19.000	0.000	19.000
Total Adjustments	0.000	0.000	19.000	0.000	19.000
• 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	19.000	0.000	19.000

Change Summary Explanation

New start in FY20.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019	
Appropriation/Budget Activity 3600 I 7				**R-1 Program Element (Number/Name)** PE 0305022F I *ISR Modernization &* *Automation Dvmt (IMAD)*						**Project (Number/Name)** 675197 I *Core Technology*	

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
675197: *Core Technology*	-	0.000	0.000	16.000	0.000	16.000	16.000	16.000	16.000	16.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 7, PE 0305022F, project 675197, Algorithmic Warfare, is a new start.

A. Mission Description and Budget Item Justification

(U//FOUO) Algorithmic Warfare encompasses efforts to develop, employ, or field artificial intelligence, automation, machine learning, deep learning, and computer vision algorithms. This critical shift to the digital age will transition ISR analysis from the "what" to the "why" of analysis via human-machine teaming. Algorithmic Warfare can provide world-class ISR support to Joint Operations at the scale and speed required in modern warfare against our adversaries.

(U//FOUO) Algorithmic Warfare reshapes current sense, identify, attribute, share (SIAS, previously known as PED - processing, exploitation, and dissemination) models because the current models will be unsustainable and ineffective in developing ISR digital solutions to find efficiencies and thrive in a complex operating environment. This funding is a first step to address ISR analysts' struggles with data overload; they currently spend 80 percent of their time searching for data and 20 percent of their time making sense of the information.

(U) Supports National Defense Strategy priority of operating at the "speed of relevance."

(U) Supports Next Generation ISR Dominance Flight Plan.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Algorithmic Warfare	-	0.000	16.000
Description: SECAF directed the AF to invest in a more automated environment to relieve strain on manpower in the out years. Algorithmic Warfare can provide world-class ISR support to Joint Operations at the scale and speed required in modern warfare against our adversaries. This effort supports National Defense Strategy of operating at the "speed of relevance."			
FY 2019 Plans: N/A			
FY 2020 Plans: Provides RDT&E funding to develop ISR Algorithmic Warfare - artificial intelligence, automation, machine learning, deep learning, and computer vision algorithms.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, **RDT&E Project Justification:** PB 2020 Air Force		**Date:** February 2019
Appropriation/Budget Activity 3600 *I* 7	**R-1 Program Element (Number/Name)** PE 0305022F *I ISR Modernization &* *Automation Dvmt (IMAD)*	**Project (Number/Name)** 675197 *I Core Technology*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020**
New start in FY20.			
Accomplishments/Planned Programs Subtotals	-	0.000	16.000

C. Other Program Funding Summary ($ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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.

Exhibit R-3, **RDT&E Project Cost Analysis:** PB 2020 Air Force												**Date:** February 2019		
Appropriation/Budget Activity 3600 *I* 7						**R-1 Program Element (Number/Name)** PE 0305022F *I ISR Modernization & Automation Dvmt (IMAD)*						**Project (Number/Name)** 675197 *I Core Technology*		

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**
Algorithmic Warfare	TBD	HAF/A2 : Pentagon, DC	-	0.000		0.000		16.000		-		16.000	Continuing	Continuing	-
Subtotal			-	0.000		0.000		16.000		-		16.000	Continuing	Continuing	N/A

			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		16.000		-		16.000	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 3600 / 7	R-1 Program Element (Number/Name) PE 0305022F / ISR Modernization & Automation Dvmt (IMAD)	Project (Number/Name) 675197 / Core Technology

	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
Algorithmic Warfare																												
Begin Algorithm Development									█	█																		

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 *I* 7	**R-1 Program Element (Number/Name)** PE 0305022F *I ISR Modernization &* *Automation Dvmt (IMAD)*	**Project (Number/Name)** 675197 *I Core Technology*

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Algorithmic Warfare				
Begin Algorithm Development	1	2020	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force											Date: February 2019	
Appropriation/Budget Activity 3600 I 7				**R-1 Program Element (Number/Name)** PE 0305022F *I ISR Modernization &* *Automation Dvmt (IMAD)*						**Project (Number/Name)** 675306 *I Analysis Enterprise*		

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
675306: *Analysis Enterprise*	-	0.000	0.000	3.000	0.000	3.000	3.300	3.200	3.300	3.400	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 This program, BA 7, PE 0305022F, project 675306, Kill Chain Automation, is a new start.

A. Mission Description and Budget Item Justification

 (U) AF ISR must adapt large data sets and condition it into mission sets, allowing personnel to discover, manage, and analyze data and transform it into living intelligence. Kill Chain Automation applies new methodologies; advances automation and machine learning; ensures data is accessible, agreeable, and interoperable; and delivers decision advantage.

 (U) Supports National Defense Strategy priority of operating at the "speed of relevance."

 (U) Supports Next Generation ISR Dominance Flight Plan.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Kill Chain Automation	-	0.000	3.000
Description: AF's first ISR investment to work large data sets, automation, COTS IT tolls, and data aggregation. *FY 2019 Plans:* N/A *FY 2020 Plans:* Funds software development to automate ISR analyst workflows; analysts currently spend 80 percent of their time searching for data and 20 percent of their time making sense of information. Human-machine teaming allows humans and machines to focus on activities they each do best. *FY 2019 to FY 2020 Increase/Decrease Statement:* FY20 New Start			
Accomplishments/Planned Programs Subtotals	-	0.000	3.000

C. Other Program Funding Summary ($ in Millions)
 N/A

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 0305022F / *ISR Modernization & Automation Dvmt (IMAD)*	**Project (Number/Name)** 675306 / *Analysis Enterprise*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

 N/A

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 0305022F / ISR Modernization & Automation Dvmt (IMAD)				**Project (Number/Name)** 675306 / Analysis Enterprise			

Product Development ($ in Millions)			**Prior Years**	**FY 2018**		**FY 2019**		**FY 2020 Base**		**FY 2020 OCO**		**FY 2020 Total**	**Cost To Complete**	**Total Cost**	**Target Value of Contract**
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**
Kill Chain Automation	C/Various	HAF/A2 : Pentagon, DC	-	-		-		3.000	Dec 2019	-		3.000	Continuing	Continuing	-
Subtotal			-	-		-		3.000		-		3.000	Continuing	Continuing	N/A

	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	3.000	-	3.000	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 3600 / 7	**R-1 Program Element (Number/Name)** PE 0305022F / ISR Modernization & Automation Dvmt (IMAD)	**Project (Number/Name)** 675306 / Analysis Enterprise

	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
Kill Chain Automation																												
Begin automation development									▮▮▮																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 *I* 7	**R-1 Program Element (Number/Name)** PE 0305022F *I ISR Modernization & Automation Dvmt (IMAD)*	**Project (Number/Name)** 675306 *I Analysis Enterprise*

Schedule Details

Events by Sub Project	Start		End	
	Quarter	**Year**	**Quarter**	**Year**
Kill Chain Automation				
Begin automation development	1	2020	4	2020