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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 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</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>
Total Program Element	-	41.055	62.618	56.325	0.000	56.325	74.535	82.947	81.488	76.597	Continuing	Continuing
642810: <i>Cyber Workforce Development</i>	-	6.550	17.462	8.200	0.000	8.200	8.400	8.650	8.451	8.434	Continuing	Continuing
642812: <i>System Security Engineering</i>	-	7.411	13.059	17.001	0.000	17.001	17.072	19.378	19.474	17.379	Continuing	Continuing
642816: <i>Agile/Adaptable Standards</i>	-	5.214	4.992	7.250	0.000	7.250	8.500	9.750	9.144	9.130	Continuing	Continuing
642834: <i>Mission Assurance for Fielded Systems</i>	-	18.080	20.925	17.036	0.000	17.036	33.654	37.584	36.969	34.650	Continuing	Continuing
642836: <i>Mission Thread Analysis</i>	-	3.800	6.180	6.838	0.000	6.838	6.909	7.585	7.450	7.004	Continuing	Continuing

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

This program funds activities at the Cyber Resiliency Office for Weapon Systems (CROWS), which is based at Hanscom Air Force Base, MA and provides acquisition cyber support to the Air Force Lifecycle Management Center, Air Force Test Center, Air Force Nuclear Warfare Center, Space and Missile System Center, and Air Force Operational Test and Evaluation Center. CROWS accomplishes two goals to increase weapon systems cyber resiliency/security in all phases of the acquisition life cycle. First, CROWS builds cyber resiliency into weapon systems by integrating cyber design tenets into the systems engineering process. Second, CROWS assesses and protects fielded systems from cyber exploitation.

To meet these goals, this program addresses cyber resiliency and security gaps in five projects. The first project targets the workforce by increasing cyber security and resiliency skills, knowledge, and experience of acquisitions personnel. The second project targets system security engineering activities by prototyping, evaluating, and transitioning cyber secure and resilient risk-informed processes, tools, products, and policies into all phases of the acquisition life cycle. The third project develops standards for designing new weapon systems by defining a government reference architecture, affords weapon system designers the opportunity to use open system architectures, and provides the capability to rapidly update weapon systems cyber components in response to new cyber threats. The fourth project performs bottom-up cyber assessments on individual Air Force weapons systems, addressing the Fiscal Year 2016 National Defense Authorization Act (Section 1647) mandate as well as designing mitigation strategies and prototyping solutions for known cross-platform vulnerabilities. The final project uses a top-down approach to evaluate mission sets of Air Force weapons systems and addresses gaps in mission assurance due to evolving cyber threats.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CROWS capabilities. 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, 0605833F, and 0605898F.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>
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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 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.

<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	32.253	62.618	60.667	0.000	60.667
Current President's Budget	41.055	62.618	56.325	0.000	56.325
Total Adjustments	8.802	0.000	-4.342	0.000	-4.342
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	10.200	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.398	0.000			
• Other Adjustments	0.000	0.000	-4.342	0.000	-4.342

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

**Project:** 642834: *Mission Assurance for Fielded Systems*

Congressional Add: *Program increase - cybersecurity and resiliency for weapon systems*

Congressional Add Subtotals for Project: 642834

Congressional Add Totals for all Projects

<b>FY 2018</b>	<b>FY 2019</b>
9.864	0.000
9.864	0.000
9.864	0.000

**Change Summary Explanation**

The FY 2020 funding request was reduced by \$4.342 million to account for availability of prior year balances.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS				Project (Number/Name) 642810 / Cyber Workforce Development			
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
642810: Cyber Workforce Development	-	6.550	17.462	8.200	0.000	8.200	8.400	8.650	8.451	8.434	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
The Cyber Workforce Development project develops and transitions cyber resiliency training, manning strategies, and deploys teams providing cyber acquisition experts to Program Executive Offices (PEO) to address acquisition workforce gaps in cyber resiliency/security manpower, experience, and knowledge. This project hones workforce expertise and skills required to counter weapon system-unique cyber threats, which exceeds the knowledge needed to secure Internet Protocol (IP) based systems against traditional network-based cyber threats. Such expertise is critical for acquisition professionals to ensure cyber resiliency/security design tenets are integrated into the weapon system life cycle.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020	
Title: Increase Acquisition Workforce Cyber Expertise									6.550	17.462	8.200	
Description: Increases knowledge and advanced skills of acquisition workforce.												
FY 2019 Plans: Complete on-board training and initial stand-up of the Cyber Resiliency Support Team (CRST) to centrally manage training, tools, and best practices for the field Cyber Focus Teams (CFTs). Hire initial CFT personnel and deploy them to eight geographically separated PEO to integrate cyber resiliency tenets into Air Force acquisition programs. Continue development and fielding of cyber training, establish an Air Force weapons system cyber training curriculum, and establish cross-service training, collaboration and standardization. Continue cyber personnel hiring/retention strategies.												
FY 2020 Plans: Continue to compile threat, weapon system and technology gaps and integrate this information into the Air Force weapon system cyber resiliency training curriculum to reduce enterprise risk. Identify cyber security/resiliency skill gaps in the functional areas of the acquisition workforce. Continue to expand and improve/validate CFT proof-of-concept based on PEO feedback. Execute hiring and retention strategy for skilled weapon system cyber resiliency acquisition professionals.												
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 decreased compared to FY 2019 by \$9.262 million. Funding decreased due to realignment of priorities to other projects within this program.												
Accomplishments/Planned Programs Subtotals									6.550	17.462	8.200	

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642810 / <i>Cyber Workforce Development</i>
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>D. Acquisition Strategy</b> When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate.		
<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.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS				Project (Number/Name) 642810 / Cyber Workforce Development					
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
Air Force Cyber Resiliency Training - Air Force Institute of Technology (AFRL)	Various	Various : Various	-	1.106	Apr 2018	8.424	Feb 2019	2.100	Nov 2019	-		2.100	Continuing	Continuing	-
Subtotal			-	1.106		8.424		2.100		-		2.100	Continuing	Continuing	N/A
Support (\$ 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
Defense Technical Information Center (DTIC), MITRE	Various	Various : Various	-	1.947	Apr 2018	6.301	Nov 2018	2.300	Nov 2019	-		2.300	Continuing	Continuing	-
Subtotal			-	1.947		6.301		2.300		-		2.300	Continuing	Continuing	N/A
Management Services (\$ 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
A&AS, Travel, Government Purchase Card	Various	Various : Various	-	3.497	Apr 2018	2.737	Nov 2018	3.800	Nov 2019	-		3.800	Continuing	Continuing	-
Subtotal			-	3.497		2.737		3.800		-		3.800	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			-	6.550		17.462		8.200		-		8.200	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 / 4								R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>						Project (Number/Name) 642810 / <i>Cyber Workforce Development</i>			

	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
Cyber Workforce Development																												
Deploy Cyber Resiliency Support Team																												
Deploy Cyber Focus Teams																												
Develop basic weapon system cyber awareness training																												
Develop advanced weapon system cyber training																												
Hire/retain cyber security professionals																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS	Project (Number/Name) 642810 / Cyber Workforce Development

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Cyber Workforce Development</b>				
Deploy Cyber Resiliency Support Team	2	2018	4	2024
Deploy Cyber Focus Teams	3	2019	4	2024
Develop basic weapon system cyber awareness training	2	2018	4	2024
Develop advanced weapon system cyber training	2	2018	4	2024
Hire/retain cyber security professionals	2	2018	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS				Project (Number/Name) 642812 / System Security Engineering			
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
642812: System Security Engineering	-	7.411	13.059	17.001	0.000	17.001	17.072	19.378	19.474	17.379	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The System Security Engineering project prototypes, evaluates, and transitions cyber secure/resilient processes, tools, products, and policies into all activities of weapon systems acquisition. This activity bolsters Air Force cyber resiliency/security by developing common security environments for Program Offices to share information on classified weapon system cyber intelligence threats and vulnerabilities. The project develops Air Force and Department of Defense system security engineering processes, policies, and contracting language, and refines intelligence collection and processes to provide actionable information on cyber threats to the weapons system community. This activity supports Air Force Program Offices, the Cyber Resiliency Support Team, embedded Program Executive Office Cyber Focus Teams, the Protecting Critical Technologies Task Force, Defense Industrial Base data protection efforts, Air Force Supply Chain Risk Management, and other weapon system cyber security/resiliency activities as required.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Prototype, Evaluate, and Transition System Security Engineering	7.411	13.059	17.001
<b>Description:</b> Prototypes, evaluates, and transitions cyber security and resiliency activities into policy, processes, products, and people.			
<b>FY 2019 Plans:</b> Continue prototyping a common cyber security environment for sharing of cyber information across Air Force weapon systems. Continue to refine and execute intelligence collection/analysis to identify cyber threats and cyber posture for specific weapon systems. Deliver next iteration of product prototypes, tools, policy and processes to integrate cyber resiliency/security in all phases and activities of weapon system acquisition.			
<b>FY 2020 Plans:</b> Continue prototyping a common cyber security environment for sharing of cyber information across Air Force weapon systems. Continue to refine and execute intelligence collection/analysis to identify cyber threats and cyber posture for specific weapon systems. Deliver next iteration of product prototypes, tools, policy and processes to integrate cyber resiliency/security in all phases and activities of weapons system acquisition.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>			



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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 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642812 / <i>System Security Engineering</i>	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>
FY 2020 increased compared to FY 2019 by \$3.942 million. Funding increased due to delivery of common secure environments and increased intelligence collection and analysis.			
<b>Accomplishments/Planned Programs Subtotals</b>		7.411	13.059
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A			
<b>Remarks</b>			
<b>D. Acquisition Strategy</b> When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate.			
<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.			

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS				Project (Number/Name) 642812 / System Security Engineering					
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
Common cyber security environments	Various	Various : Various	-	2.539	May 2018	6.686	Jan 2019	8.671	Dec 2019	-		8.671	Continuing	Continuing	-
Products, policy, and processes in the acquisition life cycle and sustainment process	Various	Various : Various	-	1.155	May 2018	1.524	Jan 2019	1.286	Dec 2019	-		1.286	Continuing	Continuing	-
Intel collection skills to identify cyber threats to weapon systems	Various	Various : Various	-	1.521	Jul 2018	2.706	Jan 2019	3.474	Dec 2019	-		3.474	Continuing	Continuing	-
Subtotal			-	5.215		10.916		13.431		-		13.431	Continuing	Continuing	N/A
Support (\$ 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
Defense Technical Information Center (DTIC)	Various	Various : Various	-	1.562	May 2018	0.498	Dec 2018	3.570	Dec 2019	-		3.570	Continuing	Continuing	-
Subtotal			-	1.562		0.498		3.570		-		3.570	Continuing	Continuing	N/A
Management Services (\$ 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
A&AS	Various	Various : TBD	-	0.634	May 2018	1.645	Dec 2018	0.000		-		0.000	Continuing	Continuing	-
Subtotal			-	0.634		1.645		0.000		-		0.000	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			-	7.411		13.059		17.001		-		17.001	Continuing	Continuing	N/A
Remarks															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force			<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>		<b>Project (Number/Name)</b> 642812 / <i>System Security Engineering</i>	

	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
<b>System Security Engineering</b>																												
Prototype and deliver common cyber security environments																												
Prototype and deliver enhanced system security engineering processes and products																												
Prototype and deliver cyber security design and contractual requirements																												
Prototype and deliver acquisition cyber intel analysis products and techniques																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force			<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642812 / <i>System Security Engineering</i>	

**Schedule Details**

<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
<b><i>System Security Engineering</i></b>				
Prototype and deliver common cyber security environments	2	2018	4	2024
Prototype and deliver enhanced system security engineering processes and products	2	2019	4	2024
Prototype and deliver cyber security design and contractual requirements	2	2018	4	2022
Prototype and deliver acquisition cyber intel analysis products and techniques	2	2018	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS				Project (Number/Name) 642816 / Agile/Adaptable Standards			
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
642816: Agile/Adaptable Standards	-	5.214	4.992	7.250	0.000	7.250	8.500	9.750	9.144	9.130	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
The Agile/Adaptable Standards project develops and prototypes adaptable Government Reference Architectures (GRA) using open standards. Systems designed with a GRA permit responsive hardware/software updates to adapt to new and evolving threats, incorporate advanced technologies, and mitigate component obsolescence. A pathfinder activity will focus on developing the next generation GRA for position, navigation and timing (PNT). This effort will provide weapon systems with a robust and resilient architecture capable of alternate navigation techniques beyond the current Global Positioning System/Inertial Navigation System (GPS/INS). The lessons learned from the PNT pathfinder will be used to develop the right policies, processes, and products for future open architectures and provide Program Offices with the capability to build agile and adaptable cyber-resilient systems.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020	
Title: Agile and Adaptable Standards									5.214	4.992	7.250	
Description: Develop, prototype, evaluate, and transition agile and adaptable system standards for integration into Air Force weapon systems.												
FY 2019 Plans: Continue prototyping open system architecture components for use in PNT systems. Prototype techniques and methodologies to increase cyber security features of open standards. Prototype the use of alternative navigation techniques using software defined receivers.												
FY 2020 Plans: Continue open system architecture prototyping, integration and demonstration of components for use in advanced architectures (e.g. electronic warfare (EW), radar, PNT, etc.). Prototype and deliver techniques and methodologies to increase cyber security features of the advanced avionics GRA and open standards. Continue prototyping the use of alternative navigation techniques and software defined receivers. Start developing a composite GRA for an advanced architectures to include major subsystems like EW, radar, PNT, communications/datalink, and autonomous functions.												
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increased compared to FY 2019 by \$2.258 million. Funding increased due to increased Department of Defense emphasis on developing and transitioning open standards.												
Accomplishments/Planned Programs Subtotals									5.214	4.992	7.250	

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642816 / <i>Agile/Adaptable Standards</i>
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>D. Acquisition Strategy</b> When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate.		
<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.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>				Project (Number/Name) 642816 / <i>Agile/Adaptable Standards</i>					
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
Prototype open system architecture components	Various	Various : Various	-	4.190	Jun 2018	4.012	Jan 2019	5.826	Jan 2020	-		5.826	Continuing	Continuing	-
Subtotal			-	4.190		4.012		5.826		-		5.826	Continuing	Continuing	N/A
Support (\$ 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
Air Force Research Laboratory (AFRL), Defense Technical Information Center (DTIC)	Various	Various : Various	-	1.024	Jun 2018	0.980	Jan 2019	1.424	Jan 2020	-		1.424	Continuing	Continuing	-
Subtotal			-	1.024		0.980		1.424		-		1.424	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			-	5.214		4.992		7.250		-		7.250	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 / 4						R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS						Project (Number/Name) 642816 / Agile/Adaptable Standards			

	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
Agile/Adaptable Standards																												
Develop and update open systems architecture processes																												
Prototype open system architecture components																												
Prototype and update open standards																												
Conduct open systems architecture pathfinders																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force			<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>		<b>Project (Number/Name)</b> 642816 / <i>Agile/Adaptable Standards</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Agile/Adaptable Standards</i></b>				
Develop and update open systems architecture processes	3	2018	3	2022
Prototype open system architecture components	3	2018	3	2019
Prototype and update open standards	3	2018	4	2024
Conduct open systems architecture pathfinders	3	2018	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS				Project (Number/Name) 642834 / Mission Assurance for Fielded Systems			
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
642834: Mission Assurance for Fielded Systems	-	18.080	20.925	17.036	0.000	17.036	33.654	37.584	36.969	34.650	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
The Mission Assurance for Fielded Systems project identifies and verifies weapon system cyber susceptibilities/vulnerabilities and determines the risk to the user, platform, and enterprise by correlating cross-platform impacts and risk to the mission. This effort also identifies mitigations to high risk cyber vulnerabilities and recommends a transition path for fielded weapon systems, subsystems, and support systems. Trusted System Network risk and programs' Supply Chain Risk Management may also be evaluated and addressed. Traditional cyber security focuses on Internet Protocol (IP) based system compliance with the Risk Management Framework (RMF), as described in National Institute of Standards and Technology (NIST) Special Publications 800-37 and 800-53. This project addresses the gaps between RMF compliance and the cyber resiliency efforts required for non IP-based fielded weapon systems, subsystems, and support systems. Activities in this project include: 1) the investigation of non-materiel mitigations, to include changes to Tactics, Techniques, and Procedures (TTPs), and 2) the investigation and prototyping of engineering materiel solutions to transfer to the Program Offices for development on their weapon systems, subsystems, and support systems.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020	
Title: Cyber Risk Assessments and Mitigation Prototyping									8.216	20.925	17.036	
Description: Evaluate weapon systems and conduct cyber risk assessments to identify, validate, and prioritize cyber vulnerabilities/susceptibilities. Partner with system owners and acquisition Program Offices to develop prototype mitigations.												
FY 2019 Plans: Continue assessment of fielded weapon systems, subsystems, and support systems for cyber susceptibilities and vulnerabilities. Continue prototyping mitigations for cyber vulnerabilities on fielded weapon systems, subsystems and support systems in realistic, high fidelity environments. Identify of common cyber vulnerabilities on fielded weapons systems and partner with the system owner and acquisition program office to prototype multi-platform mitigation prototypes.												
FY 2020 Plans: Continue assessment of fielded weapon systems, subsystems, and support systems for cyber susceptibilities and vulnerabilities. Provide an up-to-date prioritized list of Air Force weapon system vulnerabilities. Provide a centralized data repository for weapon system cyber vulnerability mitigations. Continue prototyping mitigations for cyber vulnerabilities on fielded weapon systems, subsystems and support systems in realistic, high fidelity environments. Continue identification of cyber vulnerabilities on fielded weapons systems and partner with the system owner and acquisition program office to prototype mitigation prototypes.												
FY 2019 to FY 2020 Increase/Decrease Statement:												

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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 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642834 / <i>Mission Assurance for Fielded Systems</i>	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>
FY 2020 decreased compared to FY 2019 by \$3.889 million. Funding decreased due to account for prior year balances.			
<b>Accomplishments/Planned Programs Subtotals</b>		8.216	17.036
		<b>FY 2018</b>	<b>FY 2019</b>
<b>Congressional Add:</b> Program increase - cybersecurity and resiliency for weapon systems		9.864	0.000
<b>FY 2018 Accomplishments:</b> Conducted Congressionally directed efforts			
<b>FY 2019 Plans:</b> Not applicable			
<b>Congressional Adds Subtotals</b>		9.864	0.000
<b>C. Other Program Funding Summary (\$ in Millions)</b>			
N/A			
<b>Remarks</b>			
<b>D. Acquisition Strategy</b>			
When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures.			
<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.			

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS				Project (Number/Name) 642834 / Mission Assurance for Fielded Systems					
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
Evaluate weapon systems for prototype cyber vulnerability mitigations	Various	Various : TBD	-	0.000	Jun 2018	17.425	Jan 2019	17.036	Jan 2020	-		17.036	Continuing	Continuing	-
Congressional Add - Cybersecurity and resiliency for weapon systems	Various	Various : TBD	-	9.864	Oct 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			-	9.864		17.425		17.036		-		17.036	Continuing	Continuing	N/A
Support (\$ 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
Air Force Research Laboratory (AFRL), Defense Technical Information Center (DTIC), MITRE	Various	Various : TBD	-	7.730	Jun 2018	3.500	Jan 2019	0.000	Jan 2020	-		0.000	Continuing	Continuing	-
Subtotal			-	7.730		3.500		0.000		-		0.000	Continuing	Continuing	N/A
Management Services (\$ 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
A&AS	Various	Various : TBD	-	0.486	Jun 2018	0.000		0.000		-		0.000	Continuing	Continuing	-
Subtotal			-	0.486		0.000		0.000		-		0.000	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			-	18.080		20.925		17.036		-		17.036	Continuing	Continuing	N/A
Remarks															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force			<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>			<b>Project (Number/Name)</b> 642834 / <i>Mission Assurance for Fielded Systems</i>

	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
<b><i>Mission Assurance for Fielded Systems</i></b>																												
Prototype cyber mitigations on known cyber vulnerabilities																												
Identify transition plan for tested mitigations to known cyber vulnerabilities																												
Perform cyber assessment of weapon systems, subsystems, and support systems																												
Verify and determine risk of cyber vulnerabilities found during weapon system assessments																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force			<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642834 / <i>Mission Assurance for Fielded Systems</i>	

**Schedule Details**

<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
<b><i>Mission Assurance for Fielded Systems</i></b>				
Prototype cyber mitigations on known cyber vulnerabilities	3	2018	4	2024
Identify transition plan for tested mitigations to known cyber vulnerabilities	3	2018	4	2024
Perform cyber assessment of weapon systems, subsystems, and support systems	3	2018	4	2024
Verify and determine risk of cyber vulnerabilities found during weapon system assessments	3	2018	4	2024

**Note**

Additional schedule details can be provided in the appropriate forum.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604414F / Cyber Resiliency of Weapon Systems-ACS				Project (Number/Name) 642836 / Mission Thread Analysis			
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
642836: Mission Thread Analysis	-	3.800	6.180	6.838	0.000	6.838	6.909	7.585	7.450	7.004	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
The Cyber Mission Thread Analysis (CMTA) project establishes an common, repeatable, mission-level cyber analytical methodology to prioritize where the Air Force should perform detailed cyber investigations based on potential mission impact. Analysis results provide a System-of-Systems mission context to prioritize cyber vulnerability assessments and risk mitigation strategy development across the Air Force enterprise to improve mission assurance in a cyber-contested environment. Activities include investigating existing methodologies, prototyping an analytical process, prototyping software support tools, and institutionalizing CMTA in Air Force acquisition processes. Each CMTA will identify the mission functions performed, participating systems, and top level interactions among all relevant participants from the user's point of view. By understanding operational intent, mission dependencies, and the cyber risk landscape, experts in system development, operational support, and sustainment can make objective statements about mission impact and task outcomes as well as assess potential mitigations.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020	
Title: Cyber Mission Thread Analysis									3.800	6.180	6.838	
Description: Prototypes, evaluates, and transitions methodologies, tools, and equipment in support of cyber threat for mission threads analyses.												
FY 2019 Plans: Execute Cyber Mission Thread Analysis (CMTA) on Airlift and Theater Command and Control. Working with Mission Defense Teams exploring functional mission analysis and cyber mission thread analysis collaborative efforts.												
FY 2020 Plans: Develop Cyber Mission Thread Analysis (CMTA) Training. Evolve tools, mature and institutionalize the role of Cyber Mission Thread Analysis (CMTA).												
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increased compared to FY 2019 by \$0.658 million. Justification for this increase is described in the FY 2020 plans above.												
Accomplishments/Planned Programs Subtotals									3.800	6.180	6.838	
C. Other Program Funding Summary (\$ in Millions)												
N/A												

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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 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642836 / <i>Mission Thread Analysis</i>
<b>C. Other Program Funding Summary (\$ in Millions)</b>  <b>Remarks</b>  <b>D. Acquisition Strategy</b> When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate.  <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.		



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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2020 Air Force</b>												<b>Date:</b> February 2019			
<b>Appropriation/Budget Activity</b> 3600 / 4						<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>						<b>Project (Number/Name)</b> 642836 / <i>Mission Threat Analysis</i>			

  

<b>Product Development (\$ 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>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
Air Force Research Laboratory (AFRL), Automatic Thread Generation, Mission Threat Analysis Tools	Various	Various : Various	-	2.200	Apr 2018	4.380	Jan 2019	5.038	Jan 2020	-		5.038	Continuing	Continuing	-	
<b>Subtotal</b>			-	2.200		4.380		5.038		-		5.038	Continuing	Continuing	N/A	

  

**Remarks**  
This project is a new start in FY 2018.

  

<b>Support (\$ 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>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
Air Force Research Laboratory (AFRL), Booz Allen Hamilton (BAH), Software Engineering Institute (SEI)	Various	Various : Various	-	1.600	Apr 2018	1.800	Jan 2019	1.800	Jan 2020	-		1.800	Continuing	Continuing	-	
<b>Subtotal</b>			-	1.600		1.800		1.800		-		1.800	Continuing	Continuing	N/A	

  

			<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>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			-	3.800		6.180		6.838		-		6.838	Continuing	Continuing	N/A	

  

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force																<b>Date:</b> February 2019			
<b>Appropriation/Budget Activity</b> 3600 / 4								<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>								<b>Project (Number/Name)</b> 642836 / <i>Mission Thread Analysis</i>			

	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
<b><i>Mission Thread Analysis</i></b>																												
Prioritize and conduct cyber mission thread analyses																												
Establish cyber tool set and libraries																												
Train Cyber Mission Thread Analysis (CMTA) processes and tools and Institutionalize into policy and processes																												
Prototype analysis methodologies, techniques, tools and equipment																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force			<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642836 / <i>Mission Thread Analysis</i>	

**Schedule Details**

<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
<b><i>Mission Thread Analysis</i></b>				
Prioritize and conduct cyber mission thread analyses	3	2018	4	2024
Establish cyber tool set and libraries	3	2018	4	2024
Train Cyber Mission Thread Analysis (CMTA) processes and tools and Institutionalize into policy and processes	2	2020	4	2024
Prototype analysis methodologies, techniques, tools and equipment	4	2018	4	2020