Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force											Date: May 2017	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/Demo*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	-	95.266	130.950	115.966	0.000	115.966	115.861	98.894	73.508	78.836	Continuing	Continuing
634920: *Flight Vehicle Tech Integration*	-	24.374	23.873	19.734	0.000	19.734	19.828	25.258	26.783	28.319	Continuing	Continuing
634926: *High Speed/Hypersonic Intgr and Demo*	-	47.994	92.801	78.762	0.000	78.762	78.914	49.328	21.755	22.190	Continuing	Continuing
634927: *Flight Systems Control*	-	22.898	14.276	17.470	0.000	17.470	17.119	24.308	24.970	28.327	Continuing	Continuing

A. Mission Description and Budget Item Justification

These projects support Department of Defense (DoD) priorities for demonstrations in hypersonics and unmanned systems, respectively. This program integrates and demonstrates advanced flight vehicle technologies that improve the performance and supportability of existing and future aerospace vehicles. System level integration brings together aerospace vehicle technologies along with avionics, propulsion, and weapon systems for demonstration in a near-realistic operational environment. Integration and technology demonstrations reduce the risk and time required to transition technologies into operational aircraft. Efforts in this program have been coordinated through the DoD Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication. This program is in Budget Activity 3, Advanced Technology Development because this budget activity includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	100.622	130.950	119.280	0.000	119.280
Current President's Budget	95.266	130.950	115.966	0.000	115.966
Total Adjustments	-5.356	0.000	-3.314	0.000	-3.314
• 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	-2.725	0.000			
• SBIR/STTR Transfer	-2.631	0.000			
• Other Adjustments	0.000	0.000	-3.314	0.000	-3.314

Change Summary Explanation

FY 2016 decrease reflects reprogramming to support Research and Development Projects, 10 U.S.C. Section 2358. FY 2018 decrease is due to Hypersonic funding realignment.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/ Demo*	Project (Number/Name) 634920 / *Flight Vehicle Tech Integration*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
634920: *Flight Vehicle Tech Integration*	-	24.374	23.873	19.734	0.000	19.734	19.828	25.258	26.783	28.319	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project demonstrates advanced aerospace vehicle technologies. Aerospace Vehicle Technology Integration efforts are accomplished through integration of various technologies to include avionics, advanced propulsion, and weapon systems for demonstration in near-realistic operational environments. Advanced Aerospace Structures Technologies are demonstrated to enhance the capability of current and future aerospace vehicles.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Aerospace Vehicle Technology Integration	10.632	12.546	10.371
Description: Develop, simulate, and demonstrate integrated technologies to improve the performance of aerospace platform capabilities. ***FY 2016 Accomplishments:*** Continued development of the C-17 formation flight Advanced Technology Demonstration (ATD). Completed feasibility flight test of C-17 aircraft with aft body drag reduction devices. Completed development of advanced engine system design integration to mature adaptive turbine engine technologies for advanced air vehicles along with thrust augmentors and exhaust systems to provide technical options for highly fuel-efficient engines. Initiated quiet small unmanned aerospace systems (UAS) integrated flight test. Initiated and completed designs and utility analysis of multiple low cost attritable unmanned systems viable for flight experiments. ***FY 2017 Plans:*** Complete development of the C-17 formation flight ATD. Complete quiet small UAS integrated flight test. Initiate mobility aerodynamic swept wing laminar flow flight demonstration. Initiate full flow path demonstration of a medium bypass embedded engine for next generation mobility. Initiate risk reduction exhaust systems demonstrations for future air superiority. ***FY 2018 Plans:*** Complete risk reduction of exhaust systems component demonstration for future air superiority. Initiate a large scale efficient hybrid wing body (HWB) flight validation experiment for Mobility application.			
Title: Advanced Aerospace Structure Technologies	13.742	11.327	9.363
Description: Develop and demonstrate affordable, lightweight, adaptive, and multifunctional structural concepts integrated into aerospace systems.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/ Demo*	**Project (Number/Name)** 634920 / *Flight Vehicle Tech Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: Initiated an electronic warfare and passive radar flight demonstration of an integrated antenna into load-bearing structures for small remotely piloted aircraft. Initiated a low cost airframe design and manufacturing demonstration. Initiated low cost attritable aircraft flight demonstration. ***FY 2017 Plans:*** Continue an electronic warfare and passive radar flight demonstration of an integrated antenna into load-bearing structures for small remotely piloted aircraft. Continue low cost airframe design and manufacturing demonstrations. Continue low cost attritable aircraft flight demonstration analysis and support. ***FY 2018 Plans:*** Continue low cost airframe design and manufacturing demonstrations. Continue low cost attritable aircraft flight demonstration analysis and support. Complete an electronic warfare and passive radar flight demonstration of an integrated antenna into load-bearing structures for small remotely piloted aircraft.			
Accomplishments/Planned Programs Subtotals	24.374	23.873	19.734

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-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/ Demo*	Project (Number/Name) 634926 / *High Speed/Hypersonic Intgr and Demo*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
634926: *High Speed/Hypersonic Intgr and Demo*	-	47.994	92.801	78.762	0.000	78.762	78.914	49.328	21.755	22.190	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops, integrates and demonstrates, via simulations, ground, and flight tests, advanced flight vehicle technologies that improve the performance and supportability of future high speed/hypersonic vehicles. System level integration brings together air vehicle technologies with avionics, propulsion, and warheads and other aerospace subsystems for demonstration in a near-realistic operational environment. Integration and technology demonstrations reduce the risk and time required to transition technologies into operational systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: High Speed/Hypersonic Vehicle Technologies	47.994	92.801	78.762

Description: Develop, simulate, and demonstrate integrated vehicle technologies to enable and improve the performance of future high-speed and hypersonic systems.

FY 2016 Accomplishments:
Completed preliminary design review (PDR) for Hypersonic Air-breathing Weapon Concept (HAWC) and Tactical Boost Glide (TBG) demos. Continued accelerated development and demonstration of tactically-relevant long-range high-speed strike technologies including ground and flight demonstrations needed for potential follow-on acquisition program. Continued advancement of high temperature materials and structures for hypersonic vehicles. Initiated detailed design of air-breathing weapon concept.

FY 2017 Plans:
Continue accelerated development and demonstration of tactically-relevant long-range high-speed strike technologies including ground and flight demonstrations needed for potential follow-on acquisition program. Continue advancement of high temperature materials and structures for hypersonic vehicles. Continue design of boost-glide weapon concept vehicle. Initiate the fabrication of sufficient number of hypersonic demonstration vehicles and support hardware to execute an extensive multi-year flight test program to validate several different approaches and concepts to achieve hypersonic speed.

FY 2018 Plans:
Start and complete critical design review for HAWC and TBG demonstrations. Continue accelerated development and demonstration of tactically-relevant long-range high-speed strike technologies including ground and flight demonstrations needed

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/ Demo*	**Project (Number/Name)** 634926 / *High Speed/Hypersonic Intgr and Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
for potential follow-on acquisition program. Continue advancement of high temperature materials and structures for hypersonic vehicles.			
Accomplishments/Planned Programs Subtotals	47.994	92.801	78.762

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603211F / *Aerospace Technology Dev/ Demo*	Project (Number/Name) 634927 / *Flight Systems Control*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
634927: *Flight Systems Control*	-	22.898	14.276	17.470	0.000	17.470	17.119	24.308	24.970	28.327	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program integrates and demonstrates advanced control technologies that improve the performance, reliability, safety, and survivability of existing and future, manned and unmanned, aerospace systems. Enhanced capabilities are enabled by control, automation, and system level integration of subsystems and systems such as propulsion, airframes, avionics, power & thermal management, weapons, communications, and operator interfaces. Modeling and simulation, integration, and technology demonstrations in a near-operational environment reduce the risk and time required to transition technologies into existing and future aerospace systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Autonomous Systems Control	22.898	14.276	17.470

Description: Develop, simulate, and demonstrate advanced automation and control-enabled capabilities for manned or unmanned aerospace platforms. Develop, simulate, and demonstrate autonomous flight controls for safe flight and cooperative operations between manned and remotely piloted air platforms.

FY 2016 Accomplishments:

Continued development and demonstration of technologies for situational awareness, autonomous control, and survivability for unmanned systems and manned platforms. Continued demonstration of autonomous and safe airspace interoperability for manned and remotely piloted aircraft systems. Continued development and demonstration of airborne control of teams of unmanned aircraft. Continued development and demonstration of improved accuracy, situational awareness, and safety for air drop operations. Completed development and demonstration of robust, adaptive guidance, and control of hypersonic aircraft. Completed demonstration of digital ground collision avoidance capability hosted in an analog flight control system.

FY 2017 Plans:

Continue development and demonstration of technologies for situational awareness, autonomous control, and survivability for unmanned systems and manned platforms. Continue demonstration of autonomous and safe airspace interoperability for manned and remotely piloted aircraft systems. Continue development and demonstration of airborne control of teams of unmanned aircraft. Complete development and demonstration of improved accuracy, situational awareness, and safety for air drop operations. Complete demonstration of integrated ground & air collision avoidance.

FY 2018 Plans:

Continue development and demonstration of technologies for situational awareness, autonomous control, and survivability for unmanned systems and manned platforms. Continue demonstration of autonomous and safe airspace interoperability for manned

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603211F / *Aerospace Technology Dev/ Demo*	**Project (Number/Name)** 634927 / *Flight Systems Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
and remotely piloted aircraft systems. Continue development and demonstration of airborne control of teams of unmanned aircraft. Initiate development and demonstration of reduced crew operations of future mobility aircraft.			
Accomplishments/Planned Programs Subtotals	22.898	14.276	17.470

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.