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(This section must be signed)

Individuals **outside your company**, including the companies listed above and other third parties, potentially including your competitors and others in your industry, may receive and/or review award submissions. All information submitted should address the program's management, leadership, and processes in a manner that you are comfortable sharing with third parties freely and without restriction, and may not include any classified or proprietary information or materials. Do not include any materials marked Confidential or Proprietary or bearing any similar legend. All responses and other submissions, whether in whole or in part ("Submissions"), shall be deemed not to be confidential, proprietary, and/or nonpublic information of any sort for any purpose.

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Thank you for participating,

Gregory Hamilton
President
Aviation Week Network

Acknowledged, agreed and submitted by

_____ 5/25/2022_____
Nominee's Signature Date

Nominee's Name (please print): Darshan Divakaran

Title (please print): Senior Manager, Innovation & Partnerships

Company (please print): AFWERX

NOMINATION FORM

Name of Program: AFWERX Agility Prime

Name of Program Leader: Lt. Col. Thomas Meagher

Phone Number: (719) 237-7585

Email: thomas.meagher@afwerx.af.mil

Postal Address: 100 Farfax Drive #450, Arlington, VA 22203

- ☐ Customer Approved N/A
    - Date:
    - Customer Contact (name/title/organization/phone):
- ☐ Supplier Approved (if named in this nomination form) N/A
    - Date:
    - Supplier Contact (name/title/organization/phone):

PLEASE REFER TO PROGRAM EXCELLENCE DIRECTIONS AS YOU COMPLETE THIS FORM.

EXECUTIVE SUMMARY: Make the Case for Excellence *(Value: 10 pts)*
What is the vision for this program/project? What unique characteristics and properties qualify this program for consideration?
(12 pt. Times New Roman) LIMIT YOUR NARRATIVE TO THIS PAGE.

Agility Prime is the first program under the Prime division of AFWERX, the innovation arm of the Department of the Air Force (DAF). AFWERX operates under the Air Force Research Laboratory and is directed by Colonel Nathan Diller. AFWERX accelerates agile and affordable new technologies by teaming innovative developers with Airman and Guardian talent. To preserve enduring operational advantage for the United States, AFWERX is leading a cultural transformation within the DAF to both establish future operational systems and transform current processes that develop, field, and sustain those systems.

AFWERX leads and inspires innovation throughout the DAF by building collaborative teams of technologists, operators, and acquirers through three core divisions: AFVentures, Spark, and Prime. AFVentures partners with industry, investors, and academia to broaden access to innovative technology, using tools such as the Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs. Spark provides innovative concepts for employing those technologies on operational problems by networking, training, and empowering Airman and Guardian talent.

Prime then drives the transition of emerging technologies to the field. Agility Prime, the first Prime program launched in April 2020, seeks to partner seasoned Subject Matter Experts (SMEs) with commercial companies that are developing hybrid and fully electric vertical takeoff and landing (VTOL) aircraft. By making government testing capabilities and aviation experts available to Air Race companies, Agility Prime truly "primes the pump" for brand-new, dual-use capabilities that can offer increased capacities in the commercial world and the defense sector. By coming alongside private investors and research institutions to accelerate development of these groundbreaking technologies by investing government dollars and resources, Agility Prime ensures that the United States stays at the forefront of the emerging VTOL industry.

Agility Prime stands apart because of its innovative approach to technological development. Startups can apply for Small Business Integration Research (SBIR) and Small Business Technology Transfer (STTR) contracts, which provide phased, early-stage, high-risk funding from $50,000 to $1.8M. Never before have the military and the private sector teamed up to accomplish leaps in aviation advancement at an accelerated timeline. With the goal of demonstrating military operational capability, Agility Prime is fueling an entrepreneurial spirit in the United States by providing the DAF and commercial industry with unprecedented opportunities to breach the "valley of death" between progressive development and sustained integration.

Do not exceed 10 pages in responding to the following four descriptions; allocate these 10 pages as you deem appropriate, but it is important that you respond to all four sections. DO NOT REMOVE THE GUIDANCE PROVIDED FOR EACH SECTION.

VALUE CREATION *(*Value: 15 pts*)*
Please respond to the following prompt:

- **Clearly define the value of this program/project for the corporation**
- **Clearly define the value of this program/project to your customer**
- **Clearly define the value of this program/project to members of your team**
- **Clearly define the contribution of this program/project to the greater good (society, security, etc.)**

(12 pt. Times Roman)

As the original Prime program, Agility Prime is the bedrock of the Prime division of AFWERX and sets the precedent for future programs. In November 2021, AFWERX launched Orbital Prime, the second program under Prime aimed at addressing the dilemma of space debris. AFWERX is able to pursue additional goals and address concerns of senior DAF leadership because of the immense successes of Agility Prime.

However, Agility Prime provides an even greater value to its customers and partners. Aviation startups and small businesses that team with Agility Prime benefit from the expertise and perspectives of flight test engineers, subject matter experts, and airworthiness experts to assist in creating test plans, evaluating designs, and much more. Additionally, Prime partners gain access to government-owned in-kind testing opportunities and locations that competitors may not be able to take advantage of. These combined services that Agility Prime offers to its partners—in addition to the funding available through SBIR and STTR dollars—place these startups in a favorable position with the FAA and accelerate their trajectory to a commercial certification.

Moreover, Agility Prime's program provides a challenging yet rewarding environment for its team members. Many of Agility Prime's engineers, pilots, SMEs, analysts, and contractors have dedicated years of their lives to serving their country in the United States armed forces and possess advanced degrees from top institutions. Working alongside partners to provide consultation, test support, and evaluation in a new class of air mobility affords Prime's leading developers a chance to use their skills to solve important problems and advance pioneering technologies at a much faster pace.

Lastly, Agility Prime contributes to the greater good of society in several key ways. First, aviation companies partnering with Prime aim to develop dual-use capabilities that can serve both the commercial and the defense sectors. This new classification of air travel being designed, tested, and eventually mass produced will serve humanity's needs in many ways, from emergency services, hospital transports, and search-and-rescue, to aerial taxi services that alleviate gridlock and cut down commutes in major cities, to uncrewed cargo carriers, to same-day shipping anywhere on the planet. VTOLs will also aid the warfighter by providing disaster relief to hostile areas, transport and delivery of supplies, and ease of maintenance and surveillance on bases, among many other potential use cases. The aircrafts that companies are working to field, alongside Prime engineers and SMEs, will build a stronger, more secure nation and ensure that the United States stays ahead in this rapidly evolving new field of technology.

METRICS (Value: 15 pts)
Please respond to the following prompt:

- **What are your predictive metrics?**
- **How did you perform against these metrics?**
- **How do your predictive metrics drive action toward program excellence? Please provide examples.**

(12 pt. Times Roman)

The Prime mission aims to expand technology transition paths to accelerate emerging dual-use markets by leveraging government resources for rapid and affordable fielding. More specifically, Agility Prime is the coalescence of three technologies:

- *Electric*: Large electric power systems (automotive industry)
- *Autonomy*: AI/Autonomy/Simplified Vehicle Operations
- *Manufacturing*: Advanced manufacturing/materials

WHY: ACCELERATE FIELDING OF ELECTRIC VTOL

- *Strategic*: Establish new sustainable aviation industrial capability
- *Process*: New transition paths (contracts, certification, budget)
- *Product*: Field operationally relevant runway independent air mobility in FY23

HOW: COLLABORATIVE RISK REDUCTION

- *Tech Risk*: Opportunities for collaborative test and evaluation
- *Regulatory Risk*: Early military airworthiness review
- *Financial Risk*: Contracts for testing and early use cases

Broadly speaking, we aim to increase stakeholder engagement, ecosystem development, and regulation advancement as we develop key technology areas of interest with the following profiles/characteristics:

Distributed Electric Propulsion

- Including hybrid/alternative fuel powertrains
- Increased design/vehicle configuration options
- Significantly decreased acoustic profile
- Simplified systems - decreased maintenance implications

Automation / Autonomy

- Prime Proving Grounds - Autonomy/sensor testbed
- Multi-vehicle behaviors and control
- Ties to Manned-Unmanned Teaming (MUM-T)

Advanced Manufacturing

- Composites
- 3-D Printing

Commercial BVLOS / remote operations

Early systems engineering and business case analysis show the potential warfighter benefits:

eVTOL: Key Value Analysis Findings*

Vehicles are smaller, lower complexity, and higher redundancy than legacy aircraft providing:

- Lower lifecycle costs
- Reduced sustainment
- Increased transportability/deployability
- Increased availability
- Increased robustness
- Increased feasible fleet/unit size
- Potential for distributed basing through smaller units

Electric propulsion and wing-borne flight (for tilt-rotors) gives some eVTOLs:

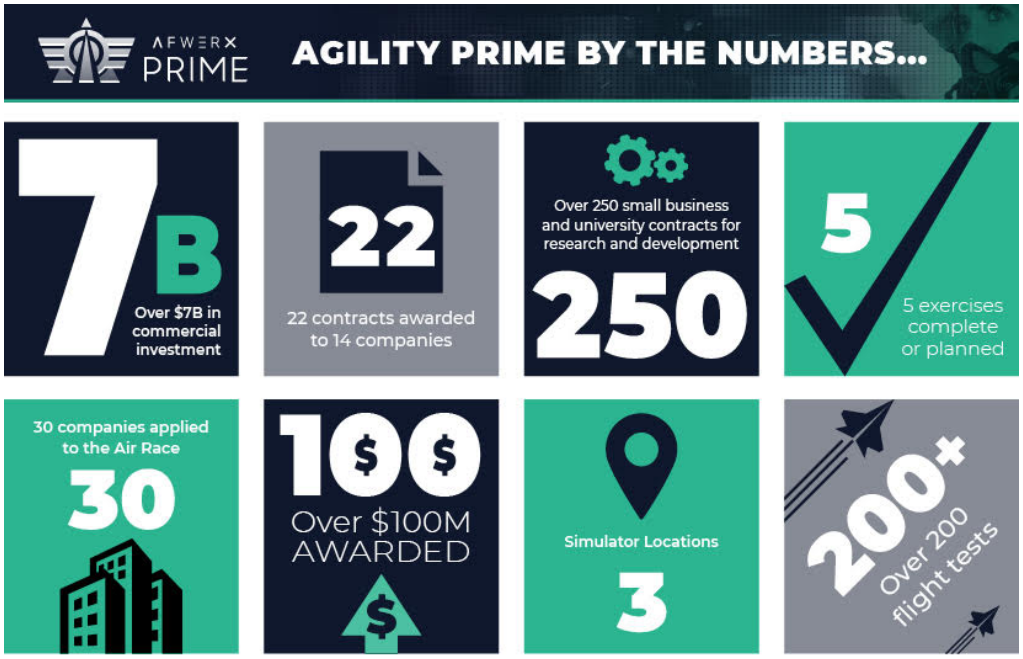
- Higher cruise speeds than helicopters
- Faster dispatch times
- Significantly lower acoustic profile

*Value analysis updated using iterative analytics informed by flight test results

DEALING WITH PROGRAM COMPLEXITY (VOLATILITY, UNCERTAINTY, COMPLEXITY, AMBIGUITY, OR VUCA)
*(*Value: 25 pts*)*

Please respond to the following prompts:

- *10 pts:* **Describe areas of VUCA faced by your program and why.**
- *15 pts:* **Explain how your team responded to these challenges.**



The Agility Prime program was created to respond to challenges that both industry and government stakeholders face in transitioning technology from development to integration and sustained use. However, within that mission, Prime must react to additional areas of complexity, including the construction of a new supply chain when existing webs of manufacturing are still suffering from pandemic delays.

Additionally, research and development testing naturally carries ambiguity, but Agility Prime SMEs collaborate with academic and commercial developers to put testing plans in place while focusing on the varied use cases of these aircraft across several interrelated focus areas.

Overall, as the above graphic testifies, Agility Prime stays focused on program milestones as it navigates jumpstarting a never-before-seen technology area. By co-investing time, resources, and expertise into these emerging dual-use technologies alongside industry, Prime responds to uncertainty and complexity with a measured, resilient approach.

Key Milestones

** Please also see the relevant media links at the end of this document.

BETA Technologies – Electric Aviation: continues to advance eVTOL technology with crewed flight testing of ALIA all electric aircraft and strategic installation of vertiport charging stations across the NE US.

- BETA first crewed electric aircraft flight airworthiness
- First charging station
- First USAF piloted operations

Joby Aviation – Batteries and Electric Infrastructure: leads the eVTOL industry with key technology contributions, increasing battery flight cycle, additive manufacturing, quiet propeller design and also investing in infrastructure to develop takeoff and landing sites in North America.

- Joby Batteries (2k - 10k cycles)
- Infrastructure Partnership

Kittyhawk Aero– Autonomy, Medevac Exercise, BVLOS testing, first USAF remote-piloted ops: matures and optimizes its Heaviside II prototypes, including autonomous flight, medical evacuation demonstrations, BVLOS testing, and first USAF remote-piloted operations.

- First exercise KH (AFRL article)
- First USAF remote operations

AFWERX Insight video on Kittyhawk: link here

LIFT HEXA – Senior Defense leadership Urban Demo and C-130 Load: LIFT Aircraft's HEXA all electric multicopter shows promise as a proving ground for key eVTOL enabling technologies including autonomy development, hybrid electric propulsion, and a variety of cargo or emitter payloads for operations. Last month, Anderson Cooper flew the LIFT HEXA on "60 Minutes" with the video link here. In addition, please find recent, relevant Agility Prime media below.

- LIFT demonstration JROC (AFRL)
- C-130 Load of LIFT HEXA

AFWERX Insight video on LIFT: link here

ORGANIZATIONAL BEST PRACTICES AND TEAM LEADERSHIP *(*Value: 35 pts*)*
Please respond to the following prompts

- *15 pts:* **Describe the innovative tools and systems used by your team**
- *10 pts:* **Define how you developed, led and managed people**
- *10 pts:* **How did you leverage skills and technologies of your suppliers?**

AFWERX and Agility Prime leadership consists of several U.S. Air Force Test Pilot graduates with aerospace and mechanical engineering backgrounds. With credentials from educational institutions spanning the U.S. Air Force Academy, MIT, Harvard, Air Force Institute of Technology, Colorado School of Mines, and Embry-Riddle, the team understands aerospace.

The program is working to transition from Developmental Test to Operational Test, towards an Initial Operational Capability (IOC) in late 2023. Applying a "team of teams" approach, Agility Prime employs test pilots, program managers, and advisors from government and industry. The team works closely with portfolio companies through milestones.

AFWERX employs a relatively flat organizational structure, with Agility Prime as part of the Prime division, focused on rapidly fielding emerging, dual-use technology. AFWERX Program Managers with technical backgrounds work with leading VTOL companies towards advancements in research, development, testing, and evaluation of respective VTOL platforms.

Utilizing funding mechanisms from Small Business Innovation Research (Phase I and Phase II contracts) to increased Tactical Funding Increase, up to Strategic Funding Increase, Agility Prime has co-invested with industry. By co-investing with industry on VTOL-focused, emerging dual-use technologies, we aimed to make every dollar go further faster, creating multiple unicorns (or perhaps Pegasus is a more appropriate term). Co-investing also allowed for portfolio companies to help build a stronger initial supplier base to advance key focus areas as well as expand the overarching VTOL ecosystem.

In addition to leveraging suppliers, AFWERX's Agility Prime leverages diverse partnerships:

- *Academia*: Support research institutions by accelerating technologies through Small Business Technology Transfer (STTR) programs
- *Industry*: Foster industrial base relationships and capabilities
- *Investor*: Build relationships across the investment ecosystem through AFVentures
- *Interagency*: Enable increased collaboration with the FAA and NASA
- *International*: Identify potential markets and coalition partners
- *Acquisition*: Identify future program office partnerships and technology transition pathways
- *Laboratory*: Support technology development and demonstration
- *Warfighter*: Inform future capability planning, near-term use cases, and collaboration across the DoD

Quick Reference | Relevant Media

- 19 Feb 2021: "Prime Investments: The Air Force is investing in electronic aircraft, hoping to jumpstart a nascent market"
  - Published by *Air Force Magazine*
  - Link here
- 5 May 2021: "Air Force awards first airworthiness approval for human flight in AFWERX Agility Prime electric aircraft program"
  - Published by AFRL
  - Link here
- 7 June 2021: "AFWERX Agility Prime Partners with Kittyhawk in First Medical Evacuation Exercise with Electric Aircraft"
  - Published by AFRL
  - Link here
- 9 July 2021: "Military Approval for Kittyhawk's Heaviside eVTOL Clears the Way for Agility Prime Contract"
  - Published by *Future Flight*
  - Link here
- 14 Sept 2021: "AFWERX Agility Prime partner, Moog Aircraft Group, creates prototype eVTOL vehicle"
  - Published by AFRL
  - Link here
- 27 Oct 2021: "AETC's Detachment 62 leading Agility Prime's training effort"
  - Published by AFRL

- Link here

- 15 Nov 2021: "Kittyhawk Announces First US airtaxi BVLOS flight"
  - Published by Kittyhawk
  - Link here

- 20 Dec 2021: Archer's First Hover Flight
  - Published by Archer
  - Link here

- 6 Jan 2022: Joby Aviation Receives FAA and USAF Approval For Second Prototype Aircraft
  - Published by *Aviation Today*
  - Link here

- 20 Jan 2022: "AFWERX Agility Prime completes first USAF-piloted flight of an eVTOL vehicle with partner Kitty Hawk"
  - Published by AFRL
  - Link here

- 21 Jan 2022: Joby Aviation adds second pre-production prototype aircraft to accelerate flight testing in 2022
  - Published by *Composites World*
  - Link here

- 23 Jan 2022: "Joby S4 hits 205 mph, flying further and faster than any eVTOL to date"
  - Published by *News Atlas*
  - Link here

- 1 Feb 2022: Elroy Air debuts the Chaparral, an autonomous VTOL Cargo aircraft
  - Published by *Aviation Today*
  - Link here

- 14 March 2022: U.S. Air Force and BETA Technologies make history with first Airman flight of an electric aircraft through AFWERX Agility Prime Program
  - Published by AFRL
  - Link here and here is the AF.mil coverage of the same story

- 13 April 2022: "Electric rotary aircraft completes first Eglin flight"
  - Published by Eglin AFB
  - Link here

- 17 May 2022: "As AFWERX Agility Prime celebrates two years, partner Joby Aviation announces acoustic data from NASA testing"
  - Published by AFRL
  - Link here