

Texas A&M University-Corpus Christi
Division of Research, Commercialization & Outreach

*Lone Star Unmanned Aircraft Systems
Center of Excellence & Innovation
Status Report*

To: Corpus Christi Business and Job Development Corporation (Type A)
By: Luis Cifuentes, Vice President for Research Commercialization & Outreach, TAMU-CC
Date: Aug. 19, 2013

On March 18, 2013, this board voted unanimously to recommend that the city support Texas A&M University-Corpus Christi with a Type A grant of no more than \$600,000. We sought these funds to cover costs associated with our efforts to establish a federal unmanned aircraft system (UAS) test-site in Texas with headquarters in Corpus Christi. We have been asked by the board to give a status report on our program focused on three topics conveyed to us by city staff and members of this board:

1. Changes in the Lone Star UAS Center of Excellence application to FAA
2. How the city's \$600,000 Type A grant is being used
3. State funding for the program

There have been **no changes in the Lone Star UAS Center of Excellence & Innovation application to FAA** since it was submitted three days before the May 6, 2013, deadline. The university, acting for the State of Texas, was comprehensively supported by Camber Corporation in this capture and proposal effort. We believe we have submitted a highly competitive proposal among 50 entities in 37 states, thanks to Camber's support and that of the Lone Star UAS Team.

Details of our proposal to FAA remain competition-sensitive; however, we can say that our 17 public- and private-sector team members represent some of the most qualified subject-matter experts in the country; and that, coupled with Texas' airspace and topography, we will operate a blue-ribbon test site that will serve the national interest and generate significant economic development, employment and educational opportunity in South Texas and across the state. The FAA plans to announce six test-site awards before the end of 2013. We have heard from reliable sources that the field has been cut to 25; however, that list has not been made public.

We have determined that **we will spend about \$586,000 of the Type A grant awarded by the city**. These funds are being spent **solely** to recover costs and secure infrastructure gaps associated with our capture and proposal effort. It has taken some months to revise our original teaming agreement with Camber Corporation in order to account for city funds. Our original agreement committed TAMU-CC and the Texas A&M University Engineering Experiment Station (TEES) to no more than \$100,000 in cash payable to Camber. We also agreed to support Camber in obtaining additional funding to recover a portion of the company's capture and proposal costs. Camber is now preparing invoices in accord with our revised teaming agreement that will draw on the Type A grant.

Pre-submission capture and proposal costs covered by the Type A grant total roughly \$250,000. The bulk of these expenditures were for travel expenses, professional services and consultants' fees prior to May 6, 2013. **Post-submission capture costs** total about \$336,000. These funds support modifications at the university's Coastal Bend Business Innovation Center (CBBIC) that are indispensable for Texas' test-site program. Our plan calls for CBBIC to be the

communications, management and business-development hub of the statewide system for UAS testing, research and development. We believe CBBIC will become a magnet for UAS-related companies – especially start-ups – and that Corpus Christi’s industrial base, economy and educational institutions will benefit as the test-site program and UAS aviation sector mature.

It must be noted that TAMU-CC, TEES, Camber and other Lone Star team members have invested an estimated \$2 million in time, effort and cash since April 2012 to pursue the federal test-site contract – and that we **deeply appreciate the City of Corpus Christi’s participation in this project.**

We anticipated in our proposal to FAA that the state legislature would support this effort through its biennial budget; however, despite our best efforts, which were supported at the highest levels of the executive branch of state government, **the Legislature declined to fund the test-site program.** We are currently developing alternative funding strategies that will draw upon public- and private-sector sources; moreover, we anticipate approaching the Legislature for support through the FY 2016-17 state budget. Our program still anticipates \$49.6 million in infrastructure development and research funding, which alone is expected to generate more than 1,200 direct, indirect and induced full-time-equivalent jobs with an overall estimated economic impact of \$260 million. (These economic-impact figures were developed by Dr. Jim Lee, Regents Professor of Economics at TAMU-CC, and submitted as part of our FAA proposal.) Fully staffed, the Lone Star UAS command and control center at CBBIC will employ 120 people with an annual payroll of no less than \$6.8 million.

Please understand that our UAS research and industrial-development plan is not dependent upon being designated as an FAA UAS test site. Even if Texas is not designated, TAMU-CC and the Lone Star team will continue to develop UAS infrastructure and research capacities in order to reap the state’s share of the multibillion-dollar national industry predicted to grow from UAS integration into the U.S. national airspace. Lone Star team members hope to spend about \$33 million over the next five years to develop UAS research infrastructure and capacity; and we believe that at least \$8 million of these expenditures qualify as matching funds for the state’s Emerging Technology Fund. We also are reviewing low-interest economic-development loan programs and are developing a private-sector industry consortium, based on highly-successful models in place at Texas A&M, to support critical research leading to significant commercialization. We expect to return to the Legislature in 2015 for significant support of infrastructure and research developing funding; and, of course, we also expect the UAS test site to begin generating revenue next year.

Failure to gear up for growth in this aviation sector means Texas will lose industrial capacity, employment opportunities, educational programs and research development. Nationally, UAS industrial development promises to become an \$8-billion industry, according to recent economic-impact studies. Our vision is that Corpus Christi will be among the leaders in that growth as a center for UAS research and innovation.

We have attached an executive summary to this report that describes the scope of our project.

We appreciate this opportunity to update the Type A Board. We welcome any questions or comments you may have.

Respectfully submitted,

Luis Cifuentes

The Lone Star Unmanned Aircraft Systems Initiative

Executive Summary

Introduction

The Lone Star Unmanned Aircraft Systems Initiative (LSUASI) is a statewide economic-development response to a sector of the aviation industry on the brink of dramatic growth: unmanned aircraft systems (UAS). UAS test ranges will be designated in six states by the Federal Aviation Administration in 2013 for the purpose of developing technologies, policies and procedures that will safely integrate UAS into the national airspace (NAS). It is critical for Texas to compete successfully for this designation in order to reap its share of UAS national industrial development and economic growth estimated at 150,000 jobs and \$8 billion annually by 2020. LSUASI proposes development of a statewide UAS test-range capability in Texas that capitalizes on the state's natural assets – uncluttered airspace and key topographies – and existing industrial base as well as its academic and industrial research, development and commercialization expertise.

Governor Perry supports this effort, which has been led by Texas A&M University-Corpus Christi and the Texas Engineering Experiment Station and is composed further of a statewide network of academic institutions, UAS industrial partners and civic entities such as the Arlington UAS Consortium. A conservative estimate of economic impact for LSUASI by 2020 is \$800 million annually and 15,000 well-paying jobs.

Competing successfully for an FAA UAS test range requires demonstrated, safe operational effectiveness of UAS technologies, well-coordinated test-range infrastructure and a business plan sufficient to support test-range operations, since the FAA test-range contract is not federally funded. Thorough review of Texas' airspace, UAS experience and expertise, developable infrastructure and financial resources indicates that the state is well positioned to compete successfully for designation as an FAA UAS test range; provided, that the state's ample capacities and existing infrastructure are developed and seamlessly coordinated into a system that provides FAA with sufficient and timely data such that the agency meets its goal of safely integrating all classes of UAS into U.S. national airspace. The test-range solicitation was released Feb. 14, 2013. It is clear that only blue-chip operations in sync with FAA requirements will rise to agency standards as well as those of the UAS industry.

The Lone Star UAS Center of Excellence & Innovation: A description

Texas airspace and existing aviation assets have driven configuration of the proposed Lone Star UAS Center of Excellence & Innovation. Texas' competitive position consists of topographies clearly stated to be of interest to FAA (for example, sparsely populated maritime and mountainous areas overflowed by few commercial and general-aviation routes) as well as the presence of UAS private-sector companies, military facilities and developable aviation infrastructure in key locations (for example, former military aviation bases in Beeville and College Station, among others).

In-depth consultation with former FAA senior executives indicates that, properly developed into a coordinated system, Texas is ideal for the type of testing, evaluation and policy development required by the agency to meet its congressionally-mandated goal of integrating all classes of UAS into U.S. national airspace over the next 10 to 15 years. As envisioned, the Lone Star center can be outlined in the following table.

Table 1: Lone Star UAS Center of Excellence & Innovation Envisioned

Components	Elements	Rationale
Facilities	Command & Control Center Corpus Christi	Proximity to maritime airspace along Padre Island previously authorized for UAS operations by FAA
	Chase Field Beeville	Proximity to South Texas large airspace over uninhabited ranch land
	Riverside Campus College Station	Proximity to airspace authorized by FAA for UAS operations in multiple classes
	Charles Johnson Airport Port Mansfield	Proximity to TAMUCC certified UAS airspace permitting chase-plane operations and expanded missions.
	Alpine Casparis Municipal Airport	Location proximate to airspace for large UAS operations in the vicinity of Big Bend National Forest
Research	<ul style="list-style-type: none"> • Human factors • Manned-unmanned interaction • Air-worthiness testing • Payload development 	These areas of research and development are stated FAA centers of interest to be covered by public and private research institutions and entities across the state.
E-commerce system	On-line administration	Provides efficient access to test-range facilities with contact information, rates, resource availability and test-range policies and procedures
	Business development	Business-development specialists will be responsible for cultivating state, national and international clients.
	Policies and procedure	Test-range operations will be managed by aviation professionals familiar with FAA regulations to ensure safe and efficient test-range operations.
Command and control system	Command & control center	This facility at Waldron Field Corpus Christi will coordinate and monitor statewide test-range operations through base facilities at each test range.
	Mission coordinator	Aviation professional with oversight responsibility for deploying statewide test-range assets such as chase planes.
	After-action report toolset	Software system for aggregating and making accessible all test-range data for use by FAA
	Live virtual constructive integrating architecture	Electronic system interfacing with operational UAS vehicles to produce training and research scenarios in virtual space without risk to actual environments (for example, urban centers)
	Situational awareness tools	An electronic system for monitoring UAS vehicles in flight as to their location, altitude and other critical factors.
	Training	Covers a wide variety of activities required by UAS operations, from piloting to ground-crew activities.
Communications network & IT infrastructure	Integrated Data Environment	An electronic system for storing and accessing all data attendant upon test-range operations.
	Communications Backbone	A secure information-technology system

	connecting all bases of operations with each other and with the command and control center
Range radars	Necessary infrastructure for tracking certain classes of UAS and monitoring test-range airspace activity

Fifty teams in 37 states are competing for all or a piece of an FAA test-range contract. The more competitive states are banking on strong political support, significant military infrastructure, available airspace and well-tuned organization. They include, in no particular order, such states as Oklahoma, Florida, Georgia, Ohio, North Dakota, Arizona and Indiana. Comparative analysis of major competitors indicates that Texas, though somewhat less mobilized than other states, has superior resources regarded as being most competitive. Texas has become a *leading* contender due to the state’s commitment to a \$49.6-million infrastructure-development plan to integrate the state’s considerable assets and capacities into a blue-chip test-range system that will satisfy FAA requirements and attract UAS industry customers with the promise of first-class service.

Significance

Integration of UAS in the national airspace represents a “Kitty Hawk moment” in the history of American aviation driven by high-tech innovation in the development of sophisticated aircraft systems. Unmanned aircraft systems promise to be more efficient and effective in a wide variety of fields that currently utilize manned aircraft – for example, helicopter surveillance of oil and gas transmission lines – but due to their low cost and innovative sensor technology, UAS also are projected to be of use in fields where the expense and logistics of manned aircraft kept aviation solutions out of reach. For example, precision surveillance of agricultural land becomes a relatively inexpensive option with programmable UAS equipped with sensors designed for that purpose, let alone the capacity for capturing and storing pertinent data efficiently. The list of potential applications of UAS, while not inexhaustible, is nonetheless lengthy even in broad strokes.

- Agriculture surveillance, research and precision applications
- Oil and gas industry monitoring, spill detection, prevention and containment
- Law enforcement, especially search and rescue but also warranted surveillance and crime prevention
- Borderlands humanitarian operations and border-security surveillance
- Transportation: traffic monitoring, analysis and accident surveillance
- Natural disaster support; for example, forest-fire and flooding surveillance
- Gulf of Mexico marine research and monitoring
- University research and technological development

Justifiable concerns over UAS invasions of privacy and civil-liberties already have been addressed by current case law, which obviates the need for protectionist statutes that will needlessly delay UAS integration. In any event, the Lone Star UAS Center of Excellence & Innovation will be designed to address critical issues of aircraft and transportation safety, which is the primary purview of the FAA. Addressing safety issues is in the national interest as a matter of homeland security but also U.S. economic well-being as the nation strives to retain technological leadership in a competitive global environment. In short, there is no downside to developing effective, efficient UAS test-range facilities in Texas. The state economy will reap financial rewards far in excess of its initial investment and contribute to the national purpose of keeping America strong and secure.

Broad impact

If Texas reaps just 10 percent of economic activity projected for the UAS national market by 2020, more than 15,000 well-paying jobs will be created by private-sector investment in UAS manufacturing and technology research and development. The state's academic and research institutions will, moreover, increase their capacities for UAS-related research funding from public and private sources. Students at all levels will benefit from this upgrade as they prepare for careers related to UAS industries, from high-tech maintenance bays to research labs and advanced flight-testing. In all likelihood, UAS industrial development in Texas, spawned by UAS integration test ranges, will lead to long-term – and, to date, unimagined – economic and educational benefits.

Table 2: UAS-related companies/Texas locations

5-D Systems, Inc. Round Rock	MobyGuard, LLC. Houston	Elbit Systems of America Fort Worth	Visual Intelligence Houston
Ascendant Engineering Solutions Austin	Raytheon Richardson/Garland	Ultra Electronics Austin	DJI Innovations Austin
AVX Aircraft Company Benbrook	RPFlightSystems, Inc. Wimberley	King Aerospace Addison	Kasling Aircraft Richardson
Bell Helicopter Textron Fort Worth	SC Technologies, Inc. Austin	Kruvand Associates Richardson	Triumph Aerostructures Grand Prairie
Cool City Avionics Mineral Wells	Tactical Impulse Fort Worth	Marotta Controls, Inc. Little Elm	Intific Austin
L-3 (Link Simulation & Training; UAS Systems) Fort Worth/Carrollton	UAS Dynamics Fort Worth	Sensor AS Fort Worth	X Technologies San Antonio
Legion Training & Simulation Abilene	Vanguard Defense Industries Spring	Alion Science & Technology Heartland	Lynntech College Station
Lockheed-Martin Fort Worth/Grand Prairie	VectorNav Technologies Richardson	Mission Technologies San Antonio	Cobham Lewisville
Microturbo, Inc. Grand Prairie	OnPoynt Unmanned Systems Dallas	ARES Corporation Houston	FreeFlight Systems Waco
Karem Aircraft, Inc. Fort Worth	Texas Hydraulics Inc Fort Worth	BAE Systems San Antonio	

Sources: Association of Unmanned Vehicle Systems International; Arlington Chamber of Commerce