FAA UAS Test Site Designation

Dr. Luis Cifuentes
Vice President for Research, Commercialization and Outreach
Texas A&M University - Corpus Christi

Presentation for:

Arlington UAS Consortium
January 27, 2014
FAA Test Site Selection Timeline

- TAMU-CC led the capture and proposal effort with Camber Corp., beginning October 2012
- TAMU-CC submitted the winning proposal on behalf of Texas in May 2013
- TAMUS BOR approved Lone Star UAS Center of Excellence and Innovation in October 2013
- FAA announced on Dec. 30, 2013 that Texas, led by TAMU-CC, had been awarded one of six UAS test sites
- TAMU-CC with support of Camber Corp. submitted 365-day activity report to the FAA on Jan. 14, 2014
- FAA visiting Corpus Christi on Jan. 30-31 to conduct a post award conference
## Unified State Effort

<table>
<thead>
<tr>
<th>Capture &amp; Proposal Team</th>
<th>Industry Support</th>
<th>Community Support</th>
<th>Government Leaders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aviation Specialties. Inc.</td>
<td>Air Cover Integration</td>
<td>Arlington</td>
<td>TX Gov Perry</td>
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<tr>
<td>AvMet Applications, Inc.</td>
<td>Arlington UAS Consortium</td>
<td>Beeville</td>
<td>TAMUS Chancellor Sharp</td>
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<td>Bay Area Houston Economic Partnership</td>
<td>CCTX EDC</td>
<td>CCTX Chamber of Commerce</td>
<td>US Rep Carter</td>
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<td>Camber Corporation</td>
<td>Fletcher Aviation</td>
<td>CCTX City Council</td>
<td>US Rep Cuellar</td>
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<td>Charles Johnson Airport</td>
<td>Greater Kingsville EDC</td>
<td>CCTX Hispanic Chamber</td>
<td>US Rep Farenthold</td>
</tr>
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<td>Chase Field Industrial Complex</td>
<td>L3 Unmanned Systems</td>
<td>Coastal Bend Council of Governments</td>
<td>US Rep Green</td>
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<td>City of Corpus Christi</td>
<td>Lockheed Martin (SW)</td>
<td>Corpus Christi</td>
<td>US Rep Olson</td>
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<td>Governors Office</td>
<td>Raytheon</td>
<td>Ft. Hood/Killeen</td>
<td>TX Sen Hinojosa</td>
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<td>Jerry Thompson &amp; Assoc.</td>
<td>Sierra Nevada</td>
<td>Kleberg County</td>
<td>TX Rep Herrero</td>
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<td>MTSI</td>
<td>TDAA</td>
<td>Mineral Wells</td>
<td>TX Rep Hunter</td>
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<tr>
<td>SWRI</td>
<td>Texas Assoc. Manufacturers</td>
<td>Nueces County</td>
<td>CC Mayor Martinez</td>
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<td>TAMU-CC</td>
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<td>Port Mansfield</td>
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<td>UT San Antonio</td>
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Impact on Texas

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<tr>
<th></th>
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- Attract more industrial development to Texas
300 Commercial UAV Applications

Save Time, Money, Reduce Risk
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- Attract more industrial development to Texas
- Enhance Texas’ long-term research capacities

AAract more industrial development to Texas

Enhance Texas’ long-term research capacities

Association of Unmanned Vehicles Systems International (AUVSI) Economic Impact Study March 2013

AAUVSI March 2013
Disaster Relief

A DECADE OF RESCUE ROBOTS 2001 TO 2011
Center for Robot-Assisted Search and Rescue
Firefighting
Ocean Research
Pipeline Monitoring
Precision Agriculture
Public Safety
Precision Mapping
Rangeland Management
# Impact on Texas

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- Attract more industrial development to Texas
- Enhance Texas’ long-term research capacities
- Provide educational and employment opportunities for generations of students in higher education
Lone Star UAS Center of Excellence and Innovation

• Led by TAMU-CC and TEES with Camber, Corp. as Lead Systems Integrator; approved by BOR
• Manages FAA Test Site
• Runs command and control center (C2) in Corpus Christi and mobile command and control units
Lone Star UAS Center of Excellence and Innovation

- Led by TAMU-CC and TEES with Camber, Corp. as Lead Systems Integrator; approved by BOR
- Manages FAA Test Site
- Runs command and control center (C2) in Corpus Christi and mobile command and control units
- Conducts research- and business development activities based at TAMU-CC business innovation center
What is the overall FAA UAS Test Site program intended to accomplish?

• Safe integration of Unmanned Aircraft Systems (UAS) into the national airspace
• Establish rules, regulations and procedures for regulating UAS operations in the national airspace
• Provide FAA approved R&D and Testing environment for key enabling UAS-NAS integration technologies such as (Sense and Avoid, C2 assurance, HMI) enabling phased UAS-NAS implementation
• Enable widespread development of applications for UAS technologies (research and commercialization)
• Door opener for innovative companies, large and small, to commercialize unmanned aviation technologies and applications
What will Texas’ responsibility be as the Test Site winner?

• Operate and develop the Lone Star UAS test-site to focus on FAA safety, airworthiness and human machine interface development
• Conduct FAA focused research (Sense and Avoid, C2 assurance, HMI, Safety and Airworthiness)
UTARI’s Research

### Research Goal No. 3: Focal Area: Develop solutions for UAS command and control link issues

<table>
<thead>
<tr>
<th>Objective</th>
<th>Investigator</th>
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<tr>
<td>TEES: Control and guidance for avoiding obstacles in cases of partial control system failure.</td>
<td>Dr. Jon Rogers</td>
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<td>TEES: Autonomous autorotation algorithms for unmanned helicopters.</td>
<td>Dr. Jon Rogers</td>
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<td>TEES: Eight-channel failsafe multiplexer to override autopilot commands.</td>
<td>Dr. Jon Rogers</td>
</tr>
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<td>UTARI: Dynamic models of communications delays and network latency in simultaneously determining the position and relative distances between multiple tracked targets.</td>
<td>Dr. Kamesh Subbarao</td>
</tr>
<tr>
<td>UTARI: Cooperative guidance and path-planning algorithms based on probabilistic threat exposure maps enabling emergency landing site selection based on pre-deployment and real-time GIS data.</td>
<td>Dr. Atilla Dogan</td>
</tr>
<tr>
<td>UTARI: Multi-UAS conflict prediction, avoidance and prevention using conventional Internet and cellular network infrastructures to provide indirect location and trajectory information for small UAS.</td>
<td>Dr. Kamesh Subbarao</td>
</tr>
<tr>
<td>UTARI: Simulation research for autonomous guidance to pilot UAS in adversarial environments.</td>
<td>Dr. Atilla Dogan</td>
</tr>
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### Research Goal No. 5: Focal Area: Develop UAS ground and airborne sense-and-avoid technologies

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<tr>
<td>TAMUCC: WAAS/ADS-B technologies for on-board sense and avoid capability.</td>
<td>Dr. Ruizhi Chen</td>
</tr>
<tr>
<td>SWRI: Cooperative system algorithms and procedures to facilitate multivehicle operation.</td>
<td>R. Lopez</td>
</tr>
<tr>
<td>UTARI: Simulation of aerial refueling of UAS systems.</td>
<td>Dr. Atilla Dogan</td>
</tr>
<tr>
<td>UTARI: Collision avoidance by cooperative target tracking where network connectivity changes arbitrarily.</td>
<td>Dr. Kamesh Subbarao</td>
</tr>
<tr>
<td>UTARI: Obstacle detection and avoidance using probabilistic threat exposure maps.</td>
<td>Dr. Dogan/Dr. Huff</td>
</tr>
<tr>
<td>TTU: Small UAS machine learning, computational modeling &amp; control algorithms</td>
<td>Dr. M. Sridharan</td>
</tr>
</tbody>
</table>
How will the team (and companies who come to test) utilize the site?

- Fee for service based on the range-loading plan to include UAS development and developmental, flight and FAA qualification testing
- Team members are likely to receive a discount for having supported Texas’ test-site proposal
- Graduated fee structure encourages development of start-up companies, but is also designed to offer a full-range of services to well-established UAS vendors
- No exclusionary practices or procedures are allowed by the FAA
LSUASC Range-user Industry Days
March 11-12, 2014
TAMU-CC Performing Arts Center

• Range and test site users by invitation only
• One-on-one meetings March 11
• Industry days for vendors and service providers TBA
  o Industry-day updates at www.lsuasc.tamucc.edu
Questions?