



**Federal Aviation  
Administration**

# **FAA COE CST Overview & Status**

***Ken Davidian  
COE CST ATM2 in Socorro, NM  
October 31, 2012***



# Overview

- People
- Tasks
- Reports
- Funding
- Organization



# University of Colorado



SIERRA  
NEVADA  
CORPORATION

Dream



FAA  
Center of Excellence  
for  
Commercial Space Transportation  
is established with



University of Colorado Boulder

in partnership with industry, academia  
and government for the purpose of conducting  
commercial space transportation research,  
education, and training.

2011

*Randy Babbitt*  
Randy Babbitt  
Administrator  
Federal Aviation Administration

# Stanford University



**Tom  
Colvin**

**Francisco  
Capristan**

**Alan  
Li**

**Jose  
Padiá**

**Jonah  
Zimmerman**

**Professor  
Scott  
Hubbard**

# University of Texas Medical Branch



L to R: Richard Jennings\*\*, Anil Menon\*, Jennifer Law\*, Tarah Castleberry\*\*, Becky Blue\*, Jim Vanderploeg\*\*, James Pattarini\*, James Cushman\*, Charles Mathers\* (via computer).  
\*\*Faculty. \*Resident (student) in aerospace medicine.

# New Mexico Tech



# Florida State University



FAA  
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The Florida State University  
in partnership with industry, academia  
and government for the purpose of conducting  
commercial space transportation research,  
education, and training.  
2011

*John Bacon*  
Federal Aviation Administration

# Florida Institute of Technology





# University of Central Florida



COE CST Second Annual Technical Meeting (ATM2)  
October 30 – November 1, 2012



Federal Aviation  
Administration

# University of Florida



# New Mexico State University

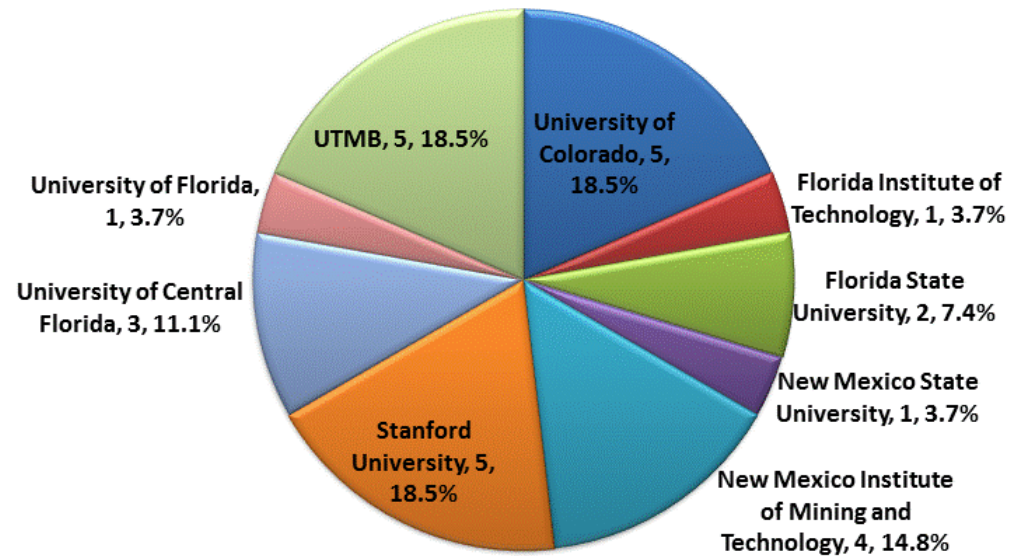
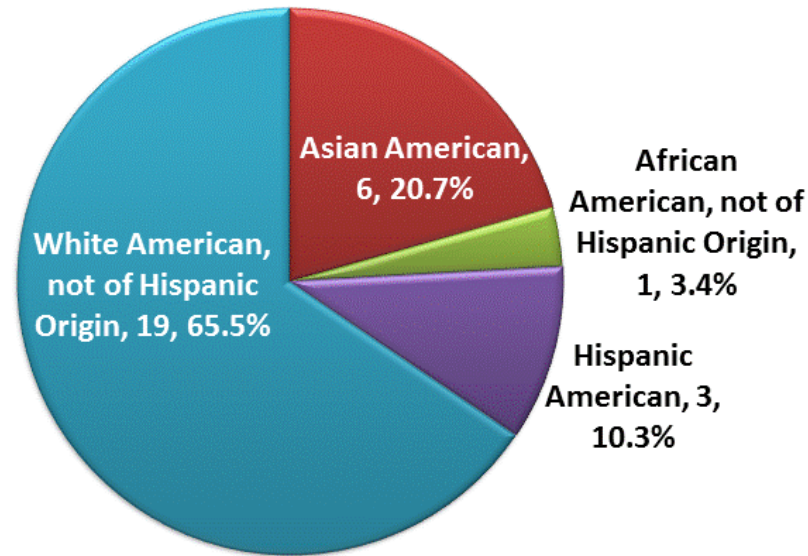
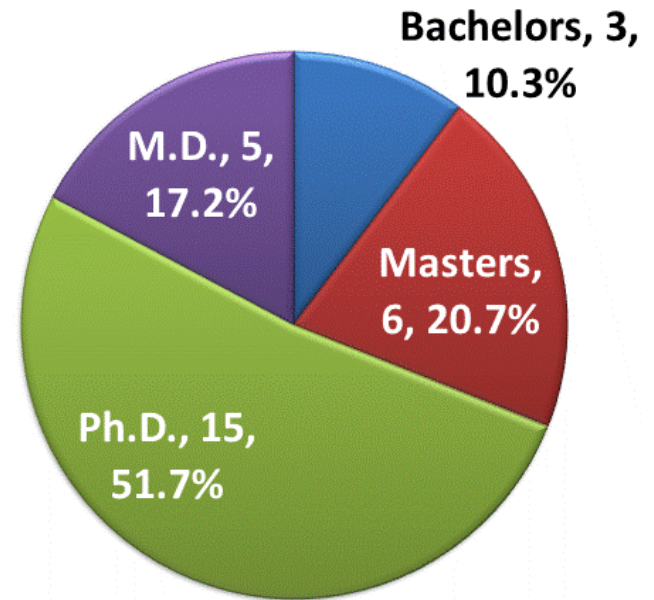
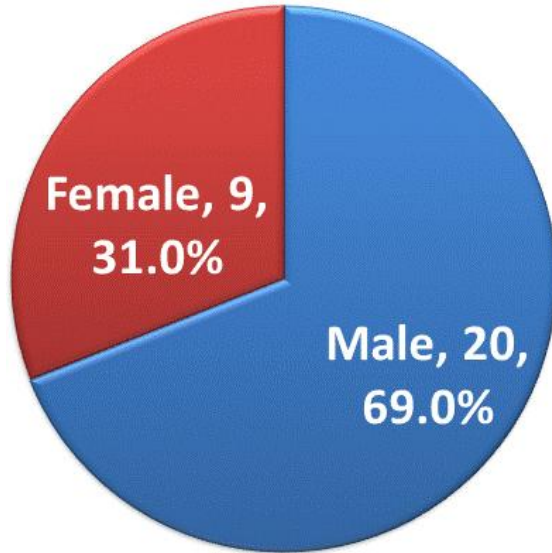


# COE CST: It's All About the People...



26-27 March 2012, ESIL-02 Workshop, Washington DC

# COE CST Students



# AST Research Areas & Interdependencies

## 1. Space Traffic Management & Operations

- 1.1 Orbital
- 1.2 Suborbital
- 1.3 NAS Integration
- 1.4 Spaceport Operations
- 1.5 Integrated Air/Space Traffic Management

## 3. Human Spaceflight

- 3.1 Aerospace Phys & Medicine
- 3.2 Personnel Training
- 3.3 ECLSS
- 3.4 Habitability & Human Factors
- 3.5 Human Rating



## 2. Space Transportation Ops, Technologies & Payloads

- 2.1 Ground System & Ops Safety Techs
- 2.2 Vehicle Safety Analyses
- 2.3 Vehicle Safety Systems & Techs
- 2.4 Payload Safety
- 2.5 Vehicle Ops Safety

## 4. Space Transportation Industry Viability

- 4.1 Markets
- 4.2 Policy
- 4.3 Law
- 4.4 Regulation
- 4.5 Cross-Cutting Topics

# All FAA AST R&D Tasks (as of 24 Oct 2012)

Task # Name / PI Name (Univ) - AST TM	Task # Name / PI Name (Univ) - AST TM
<b>185 Unified 4-Dimensional Trajectory Analysis</b> Alonso (SU) - Wilde	<b>210 ADS-B Advanced Flight Hardware</b> (ERAU #3) - Demidovich
<b>186 Space Environment MMOD Modeling and Prediction</b> Close (SU), Fuller-Rowell (CU) - Shelton-Mur	<b>228 Magneto-Elastic Sensing for Structural Health Monitoring</b> Zagrai & Ostergren (NMT) - Demidovich
<b>187 Space Situational Awareness</b> Scheeres (CU) - Earle	<b>241 High Temperature Pressure Transducers</b> Sheplak (UF), Oats (FSU) - Demidovich
<b>208 Space Vehicle Debris Hazard Airspace Stratification Feasibility Study</b> – (ERAU #1) - Murray	<b>244 Autonomous Rendezvous and Docking</b> Fitz-Coy (UF), Collins (FSU), Rock (SU), Axelrad (CU) - Earle
<b>209 Aviation Impact from Space Operations Analysis Process</b> (ERAU #2) - Murray	<b>253 Ultra High Temperature Composites</b> Gou & Kapat (UCF) - Demidovich
<b>211 Key Spaceport Planning and Design Requirements Study</b> (ERAU #4) - Rey	<b>258 Multi-Disciplinary Analysis of Safety Metrics</b> Alonso (SU) - Wilde
<b>213 Correlations of Icing Potential Index to Triggered Lightning Risk</b> - (ERAU #6) - Shelton-Mur	<b>259 Flight Software Validation &amp; Verification for Safety</b> Alonso (SU) - Wilde
<b>214 Electric-Field Triggering Conditions and Vehicle Plume Effects</b> - (ERAU #7) - Shelton-Mur	<b>293 Reduced Order Non-Linear Structural Modeling</b> Miller (NMT) - Demidovich
<b>216 Spacecraft and Propulsion Technician Training and Certification</b> - (ERAU #9) - Rey	<b>298 Integration Evaluation of ADS-B Payloads</b> Hynes (NMSU) - Demidovich
<b>220 Space Operational Framework</b> Hynes (NMSU) - McElligott	<b>299 Nitrous Oxide Composite Tank Testing</b> TBD (NMT) - Tran
<b>247 Air and Space Traffic Considerations for CST</b> Villaire (FIT) - Murray	<b>193 Role of COE CST in EFP</b> Hubbard (SU), Born (CU) - Davidian
<b>257 Master's Launch and On-Orbit Operations Laboratory</b> Born (CU) - Lampazzi	<b>215 Certification and Safety Analysis for Next-Generation Launch Vehicles</b> - (ERAU #8) - Demidovich
<b>181 Physiological DB Definition and Design</b> Vanderploeg (UTMB) - Lampazzi	<b>263 Commercial Space Industry Viability Research Contract</b> Foust (Futron) - Davidian
<b>182 Human System Risk Management Approach</b> Vanderploeg (UTMB) - Lampazzi	<b>301 Spaceport Regulation in a Post-modern Pluralistic World</b> Jakhu (MU) - TBD
<b>183 Crew and HSP Medical Standards</b> Jennings (UTMB) - Lampazzi	<b>302 International Commercial Space Regulations (?)</b> Jakhu (MU) - Touré
<b>184 Human Rating of Commercial Spacecraft</b> Klaus (CU) - Lampazzi	<b>XXX FATESS Contract Industry Reporting Tasks</b> Maliga (Tauri) - Davidian
<b>212 LEO Radiation Impacts on Humans and Safety Critical Components</b> – (ERAU #5) - Shelton-Mur	<b>296 CESTAC Support and Outreach</b> Fiedler (FIT) - Davidian
<b>255 Wearable Biomedical Monitoring Equipment</b> Jennings (UTMB) - Lampazzi	<b>297 Technical Oversight &amp; OMIS</b> Alvi (FSU) - Davidian
<b>256 Additional NASTAR Centrifuge Testing</b> Vanderploeg (UTMB) - Lampazzi	<b>300 Collaborative Activities</b> Fiedler (FIT) - Davidian
<b>294 Minor Injury Severity Scale</b> Jennings (UTMB) - Gerlach	<b>Orion America Technologies Contract</b> Gregorek - Davidian
<b>295 EMF Effects on Implantable Devices</b> Vanderploeg (UTMB) - Lampazzi	<b>Note:</b> There are 37 R&D tasks (26 conducted by COE CST) & 4 Admin tasks.

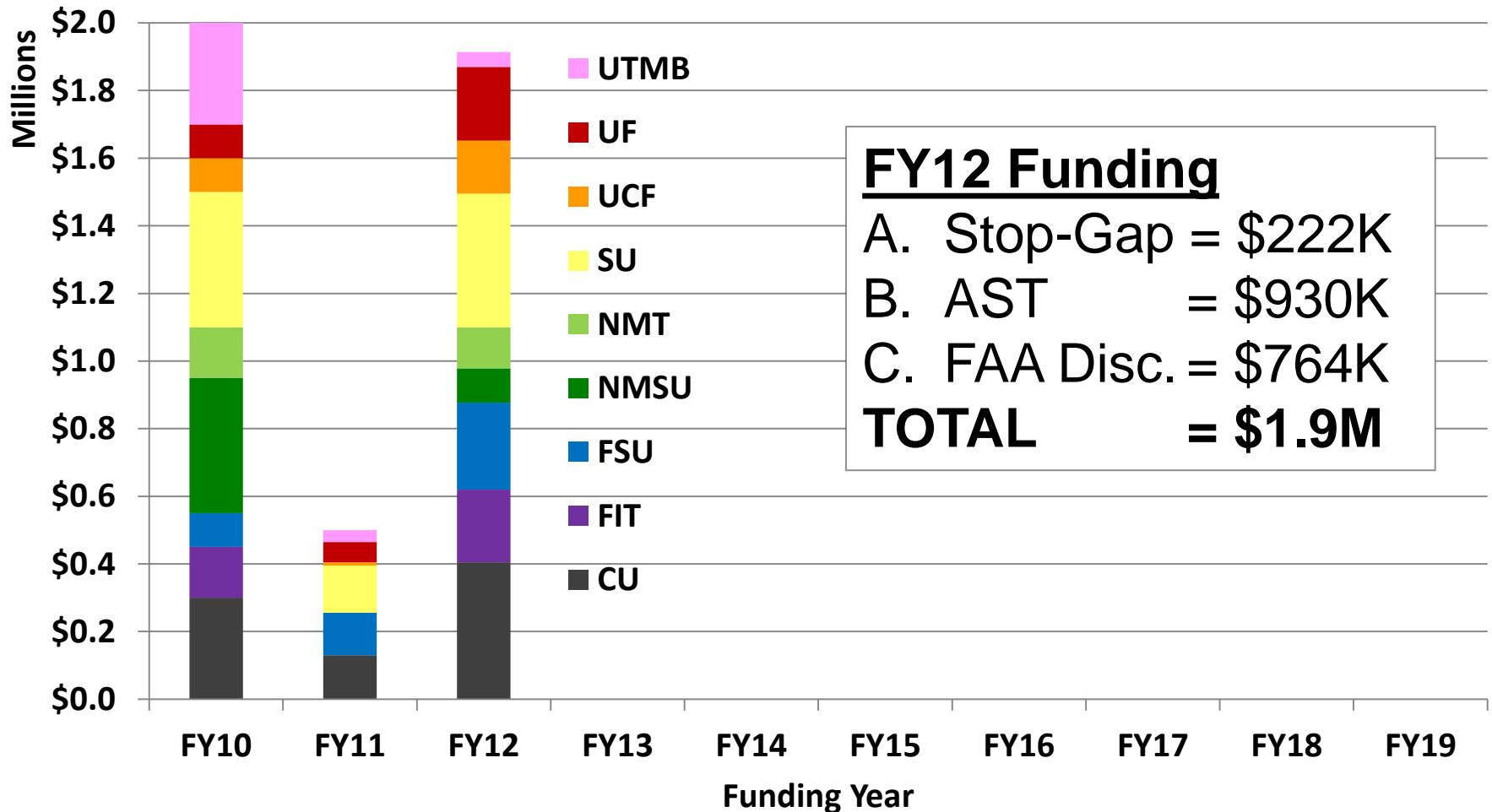
# COE CST Year 2 Reports - On the web!

- ☞ Task 184-CU: "Evaluation of Commercial Human Spaceflight Laws and Regulations in the United States", October 2012.
- ☞ Task 184-CU: Klaus, D., Fanchiang, C. and Ocampo, R., "Perspectives on Human-Rating", 42nd International Conference on Environmental Systems, July 2012.
- ☞ Task 193-CU: Cheetham, B., et. al. "Government's Role in Commercial Space From the Perspective of Emerging Industry Leaders", IAC, October 2, 2012.
- ☞ Task 193-CU: Cheetham, B. "Theory Based Analysis of The Commercial Crew to Orbit Transportation Industry Structure and Evolution", IAC, October 3, 2012.
- ☞ Task 257-CU: Cheetham, B. "Commercial Spaceflight Operations: Graduate Level Curriculum Development", IAC, October 2, 2012.
- ☞ Task 247-FIT: Villaire, Nat. "Integration of Commercial Space Vehicle Traffic into the National Airspace System", March 31, 2012.
- ☞ Task 220-NMSU: Spaceport Operations Framework Group Video.
- ☞ Task 193-SU: Zimmerman, J. et. al., "Research Roadmap for Commercial Space Transportation", International Astronautical Congress, October 2012.
- ☞ Task 193-SU: Zimmerman, J., et. al. "FAA Office of Commercial Space Transportation Research Roadmap", Global Space Exploration Conference, April 2012.
- ☞ Task 183-UTMB: Jennings, R. "Flight Crew Medical Standards and Spaceflight Participant Medical Acceptance Guidelines for Commercial Space Flight", August 6, 2012.

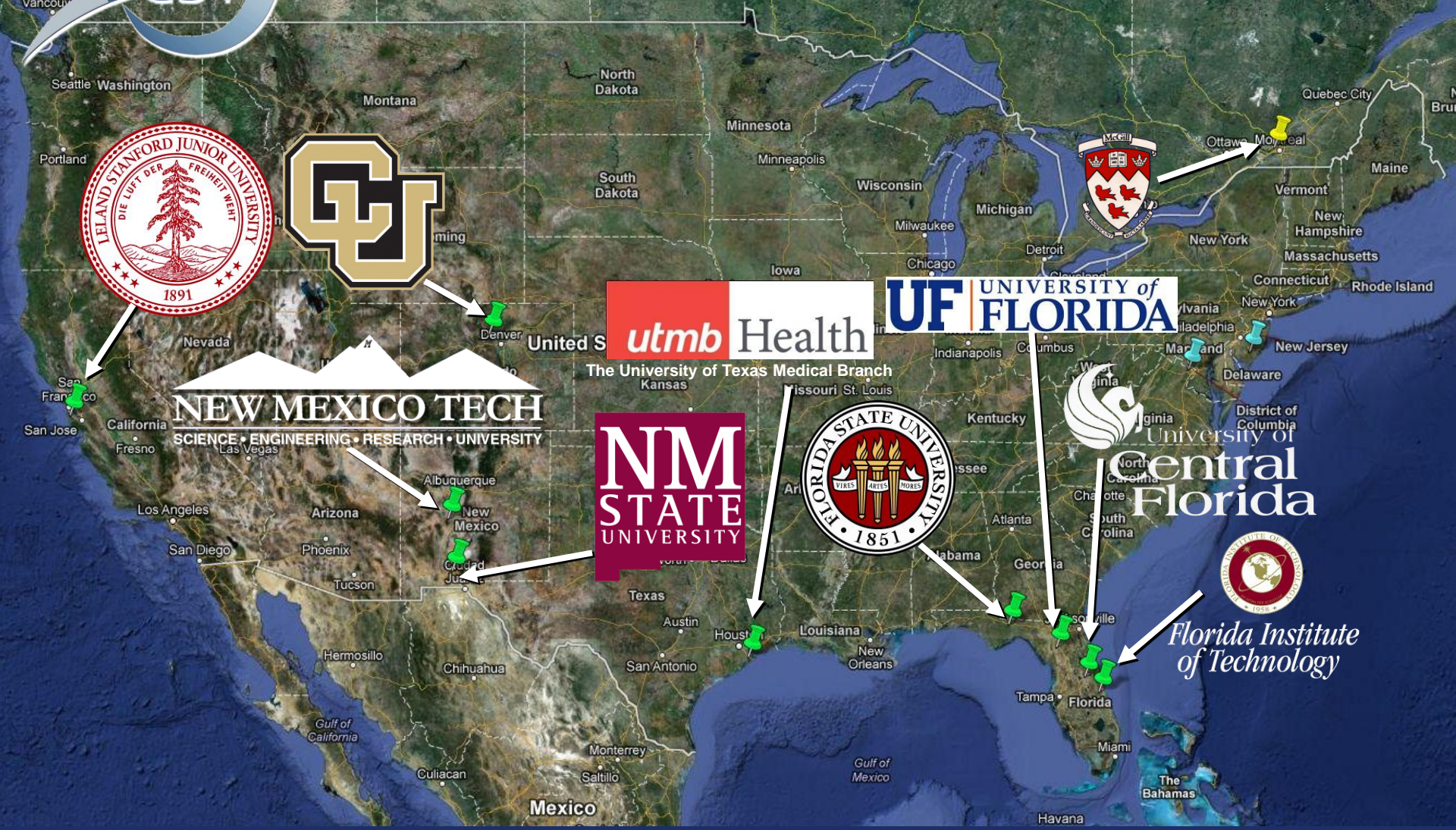
***Find all these reports at [www.coe-cst.org](http://www.coe-cst.org) under the "Publications" tab.***



# COE CST Funding History



# FAA Center of Excellence for Commercial Space Transportation



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Federal Aviation  
Administration

# Organizational Highlights

- **Second Annual Administrative Meeting**  
at FSU in Tallahassee, FL on April 25-26, 2012.
- **Creation of Executive Committee**  
Consolidating Coordinating, Planning Committees
- **Creation of 3 Subcommittees**  
Self-Governance, Strategic Planning, Collaboration
- **First Full Year of CESTAC Operation**
- **Two New Categories of Membership**  
Affiliate Members, Supporting Organizations

# COE CST Year 2 was made possible with generous support from...



# Summary

- Year 2 finds COE CST in “full-stride”.
- Looking forward to a productive Year 3!

<b>At-A-Glance Metrics</b>	<b>Year 1</b>	<b>Year 2</b>
<b># Research Tasks</b>	<b>25</b>	<b>33</b>
<b># Principal Investigators</b>	<b>27</b>	<b>24</b>
<b># Students</b>	<b>31</b>	<b>~29</b>
<b># Reports</b>	<b>0</b>	<b>~9</b>
<b># Affiliate Members</b>	<b>0</b>	<b>1</b>
<b>Funding</b>	<b>\$2M (FY10)</b>	<b>\$0.5M (FY11) \$1.9M (FY12)</b>