Center Overview & Update

Second Technical Symposium
August 9-10, 2010
Tallahassee, FL
For FCAAP partners, current and future stakeholders (industry and academia) to:

• Share the technical outcomes of center research
• Meet colleagues and potential partners
• Identify opportunities, share ideas
• Share advances, outcomes (and setbacks)
• Discuss future plans

TO find ways to work more efficiently with our partners resulting in a more significant impact on Aerospace (& related areas):

R &D, Technology, Industry, Education, Economy
Florida Center Of Excellence 2007 (RFP)

The 21st Century Technology, Research, and Scholarship Enhancement Act, established by the 2006 Florida Legislature, provides for the establishment of Centers of Excellence to give Florida a clear position of leadership in key emerging technology areas with the unique potential for economic and societal impact in the years to come.
Why Us?

FCAAP

Researchers at FCAAP partners have well-established, globally recognized programs spanning a broad range of aerospace/aviation areas.

Impressive collection of resources:
Unique Facilities, Capabilities and Intellectual Capital
~ 250+ students, $100 million in facilities, very strong record of attracting external funds for R & D

FCAAP members graduate an overwhelming portion of AE & ME with BS/MS & PhD degrees in the state

➢ B.S > 60%
➢ MS & PhD: > 80%
Our Mission & Approach

To develop innovative technologies for the next generation of air and spacecraft and related areas, in collaboration with industry and government.

Create an unrivalled pool of intellectual & physical resources

Enhance Florida’s (& the nation’s) aerospace, aviation and related education and training programs

Help build a high-wage, high-skill, workforce ..leading to a Diverse, knowledge-based economy with sustainable growth

By

Leveraging & Building upon unique existing resources within the SUS & state. Forming strategic partnerships as needed.
Train Personnel, Advance Science, Develop Technologies
Help create a Growing & Sustainable Industry/Economy

Next-Gen Technology Challenges / Needs

- State-Nationwide Focal Point and Resource Center
- Cutting Edge Technologies
  - Next-Gen Aircraft
  - VLJs; F-35B; F-18/H
  - Launch Systems
  - High Performance Materials

Highly-skilled Workforce Required

- Highly Skilled Workforce
- Jobs & Infrastructure (that CANNOT be MOVED)

Leveraging & Enhancing FCAAP Resources
Partnering with Industry, Gov’t & Others
Our Most Invaluable Resource

A talent pool that needs to grow
Physical Resources/Facilities

That continue to grow strategically
Our Strengths (to Date)
Technical Focus Areas

- **Active Flow & Noise Control**
  - Design of Sensors & Actuators
  - Modeling
  - Control Design

- **Advanced Propulsion & Power Generation**
  - Alternative Aviation Power
  - Advanced Turbomachinery/Gas Turbine Technologies
  - Materials

- **Next Gen Air-Vehicles & Systems**
  - Technology Integration
  - Air Traffic Management
  - Launch Vehicle

- **Education, Training, Outreach**
  - K-12 outreach
  - Post-Graduate Training
  - Professional Training, Continuing Education

- **Resources & Tools**
  - High Performance Computing
  - Test & Diagnostics/Facilities
Timeline & Milestones

December, 2007 – COE Proposal Submitted to BOG/FTRSB

June/July, 2008 – FCAAP selected as a COE (only 1 out 2)

November, 2008 – FCAAP Kick-off Meeting

August 13-14, 2009 – 1st Annual Technical Symposium

October 1, 2009 – RFP2 issued for FCAAP participants

July 11-16, 2010 – Summer Academy: Engineering the Future

August 9-10, 2010 – 2nd Annual Symposium & Exhibition
Our Vision

To become the technical (R&D) and educational focal point, resource & ‘solutions’ center for Florida and the nations’ (in certain areas) aerospace, aviation +… stakeholders.
New Initiatives

**Partnerships for Int’l Research and Education (PIRE)**
“COLLABORATIONS WITH FRANCE AND JAPAN ON MULTIPHASE FLUID SCIENCE AND TECHNOLOGIES” – NSF (Funded ~ $ 3.3 mil)

**Ultra-High-Temperature Sensors from Polymer Derived Ceramics**
– NSF, DOE, Navy (Funded ~ $ 1.3 million)

**Adaptive Robotic Multi-Modal Systems (ARM²S)** - AFRL/RWK (Eglin AFB) Campus Challenge (Funded)

**High Temperature Shape Memory Alloy (SMA) Actuators** – NASA (Funded)

**FAA Center of Excellence for Commercial Space Transportation**
- Partners: New Mexico FCAAP, FIT (Pending)
A proposal to the NSF – MRI program

Development of a Next Generation Polysonic Facility for Transformative Active Control Technologies & Non-Intrusive Flow Diagnostics (Pending)

• 12 in. x 12 in Test – Section
• Mach Number Range: 0.4 - 5
• Exceptional Optical Access
• Array of Advanced Diagnostics
New Facilities & Hardware

Non-vitiated (clean air), continuous operation, high-enthalpy, facility
- electrically operated, first stage heater with maximum temperature of 1300K (1880F)
- a second, water injection/high-enthalpy heating stage with a continuous, maximum operating temperature of 1800K (2780F)
- Mach 6.5 flight enthalpy simulation
- Currently under construction, will become operational in 4th Q 2010

~ $2.5 million in renovation & upgrades

Laser Micromachining of Materials for High Temperature MEMS-based Sensors
- Goal: To produce miniature, robust mechanical sensors for high-temperature applications.
- Approach: Develop process for laser micromachining of sapphire to facilitate use of optical transduction schemes
- Payoff: Enables measurements in environments that were previously impossible (>1000°C) and provides unique capability for micromachining of sapphire and other challenging materials

Contact Prof. Segal for more information

Contact Prof. Sheplak for more information
UCF allocated ~ $1.6M for a laboratory building and Open Air Combustion Lab (OACL).

OACL being built as an FCAAP facility to be used by the whole FCAAP community.

- Expected Completion Date: June 2011
- Key features:
  - Gas turbine combustion @ up to 20 atm, air flow up to 2.5 kg/s
  - Fuel flexibility for testing of alternative fuels
  - Downstream test rigs for cooling, materials and mechanical integrity tests.
FSU is building a state-of-the-art, ~$22+ million Research Facility: **Aeropropulsion, Mechatronics and Energy (AME) building**

House FCAAP HQ and the new PSWT
• Subsonic Tunnels & PSWT
• Advanced Materials, Actuator Design and Diagnostics Labs
• Compressed Air Systems, Power....

• All hardware and support infrastructure needed to maintain, efficiently operate & periodically upgrade, state of the art facilities housed in AME Building
AME Building – Construction in progress
NSF Graduate STEM Fellows in K-12 Education (GK-12)
“GK-12: Mentoring Aerospace Propulsion Experimental Lessons (MAPEL)” – (Pending)

FCAAP Hosted “Engineering the Future” Summer Academy
Glimpses – Summer Academy
Our Performance

Research & Resources (funding)
- Approx. 186 Proposals submitted
  - ~ 90 funded to date
- Funding Applied for ~ $79 million
  - Funding received to date ~ $18 - 20 million

Publications
- ~55 Journal Articles
- ~135 Conference Papers

People
- ~60-65 Faculty, Scientists, Post-Docs
- ~85 + Graduate Students
- ~75+ Undergraduates
Our Partners & Sponsors
FCAAP can help Florida become a leader in Aerospace, Aviation, Power Generation and related fields .. Leading to a high-skill, high-wage workforce and a talent/knowledge-based economy

Challenges are significant but so are OPPORTUNITIES

Can only be realized with Hard work, continued focus on excellence and .. sustained, long-term support from all of you
Symposium Agenda – Day 1

9:45  Keynote Speaker: Frank Brogan, Chancellor, State Univ. System

10:15  Karen Thompson, Chief Technologist, NASA KSC

10:45  Break

11:15  Steven Pfeiffer, Co-Director, FCAAP Summer Academy

   “Overview & Lessons Learned from Engineering the Future Summer Academy”

11:45  Lunch

1:00   Frank DiBello, President, Space Florida

1:45   Recap & Panel Intro - Louis Cattafesta, FCAAP Assoc. Director

2:00   Industry/Academia/Government Agencies - Panel Discussion

   Moderator-Kathleen Needham, Dept. Director, Business Partnerships, NASA GRC

   “Aerospace & Aviation: roles & opportunities for meaningful collaboration between academia, industry, and government agencies”

4:00   • Poster Session – Highlights of FCAAP Research

       • Industry Booths - Recruitment & Business Development

6:00   Dinner
Symposium Agenda – Day 2

8:30   Opening Remarks & Introduction of Keynote Speaker:
       Jay Kapat, FCAAP Assoc. Director

8:45   George Prueger, Chief Engineer, Pratt & Whitney Rocketdyne

9:30   Technical Session 1 & 2 (parallel sessions)

       Technical Session 1: Active Flow and Noise Control (AFNC)
       Six Technical Presentations (20 min each)

       Technical Session 2: Advanced Materials and Structures (AMS)
       Six Technical Presentations (20 min each)

1:00   Technical Session 3 & 4 (parallel sessions)

       Technical Session 3: Advanced Propulsion and Alternative Fuels (APAF)
       Six Technical Presentations (20 min each)

       Technical Session 4: High Performance Simulations and Computations (HPSC)
       Six Technical Presentations (20 min each)