

FAA Centers of Excellence

Joint COE for Advanced Materials

Phase III Review

Presented by: Patricia Watts, Program Director
FAA Centers of Excellence

To: Members - COE Advanced Materials

Date: March 2016



**Federal Aviation
Administration**



COE - JAMS Phase III Review

AGENDA

Part I

- Why COEs ? What it Takes to Succeed !
- Evaluation Process
- Assessment Topics & Finding
- Funding
- Outcomes
- What Next ?

Part II

- Project Overviews

**DOT Sec. Anthony Foxx visits
Joint COE for Advanced Materials**
*Co-Lead, John Tomblin, COE Director,
Wichita State University,*



Why Form COE Public/Private Partnerships ?

- **Identify, prioritize and focus on critical research requirements & areas of long-term concern/interest**
- **Gain immediate access to outside experts and strengthen internal capabilities**
- **Combine funding and scientific resources - maximize synergy and aviation research investments**
- **Educate and train a talent pool - create a repository of aviation knowledge for the next generation**
 - **Conduct research proactively with national experts and communicate findings**

*** Satisfy Congressional Mandate – PL 101-508 ***



What Does It Take to Succeed ?

- Dedicated support to carry out a well defined research agenda
- High level organizational commitments – FAA, universities, industry, others
- Sponsors with critical needs and anticipated long-term funding stream(s)
- Willingness to partner, prioritize, focus, plan, collaborate and coordinate efforts



COE Phase III Review –

Evaluation Process

- **Evaluation Input Provided by**

- University PIs / Admin Staff
- Industry Sponsors
- COE Students
- FAA Technical Monitors

- **Focus of Assessment**

- Legislative Requirements: Research / Ed / Training
- FAA & Sponsor Funded Technical Projects
- Management, Oversight and Fiscal Activities
- COE Research, Outreach & Overall Activities



DOT FAA COE Student of the Year
COE JAMS Wichita State University
Matt Oplinger

COE Assessment Topics

* COE Research

+ Impact on and Benefits to the

- Aviation Community

- FAA

> +++

+ Current Relevance

* Extent to Which the COE Has Met Additional Goals

> **FAA / COE - Highlight** Research Outcomes & Tech Transfer

> **Congressionally Defined (6+)**

• Outreach and *Information Dissemination* ~

• *Geographic Equity in location and distribution of funds* ~

+ *Leadership in the Field*

+ *Matching Contributions* ~ \$36 M

+ *Education & Training of Scientists:*

Evidence of Student Learning – # Graduates

FAA COE Funding Summary 2004 – 2015

- FAA Grant Funds Awarded: \$ _____
- FAA Projects Supported: _____
- Sponsors - Private Sector
Matching Contributions \$ _____
(*cash and in-kind)

Total Level of Effort:

\$72M

COE Academic Outcomes 2004 – 2015 COE Overall

- **Student Research Assistants & Scientists**

Graduated

- Ph.D. 121+
- M.S. 60+
- B.S. 1500+

- **+ In Progress – *Ph.D. and M.S. students***

- Scientific Publications _____

- Referred Journal Papers _____

- Conference Proceedings Papers _____

- Presentations _____

- **COE and FAA Technical Reports** _____

- **Other** + _____



WHAT NEXT ?

- **COE PMO to Brief ANG Management**
 - COE PMO extended current COE through December 14, 2017
 - COE PMO discuss assessment w Universities
 - Provide input re expected changes to the COE should it continue
 - **COE PMO Summarizes Assessment and Prepares Package for AOA**
 - **COE PMO Requests AOA Decision re**
 - > Re-compete
 - Self-Sufficiency
 - Other Option(s)
- * Carry Out Plan

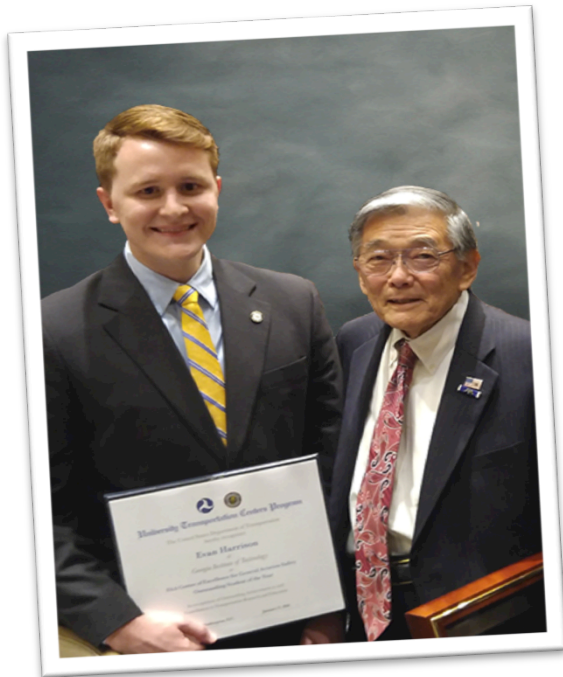
COE Assessment Feedback

- **Leadership in the field**
 - **Ability to provide needed resources & matching**
 - **Train and educate future scientists**
 - **Technology transfer**
 - ***A well oiled machine***
-
- Information dissemination activities – outreach, PR, more mtgs.
 - Foster new ideas and approaches
 - Expand relations with industry
 - Broaden involvement of team members

Q&A



**FAA Technical Center
Family Day -
*The Future of Aviation***



**Former Sec. Norman
Mineta and
DOT FAA COE
2016 Student of the Year
Evan Harrison**
Georgia Tech
*COE for General Aviation
Safety*

FAA COE Core Teams – FY 2016

Alternative Jet Fuels & Environment

(ASCENT)
 Washington State Un. (Lead)
 MIT(Co-Lead)

Boston Un.
 Georgia Institute of Technology
 Missouri Un. of Science & Technology
 Oregon State Un.
 Pennsylvania State Un.
 Purdue Un.
 Stanford Un.
 Un. of Dayton
 Un. of Hawaii
 Un. of Illinois – UC
 Un. of North Carolina – CH
 Un. of Pennsylvania
 Un. of Tennessee
 Un. of Washington

Operations Research
 (NEXTOR) – Self Sufficient
 UMd (Lead)

Airport Technology
 (CEAT) – Self Sufficient
 Un. of Illinois (Lead)

Technical Training & Human Performance

TBD – FY16

General Aviation (PEGASAS)

Purdue Un. (Lead)
 Florida Institute of Technology
 Georgia Institute of Technology
 Iowa State Un.
 Ohio State Un.
 Texas A & M Un.

Commercial Space Transportation

(CST)

Un. of Texas Medical Branch
 (Lead)

Florida State Un.
 Florida Institute of Technology
 NM Institute of Mining & Technology
 New Mexico State Un.
 Stanford Un.
 Un. of Florida
 Un. of Central Florida
 Un. of Colorado – Boulder

Advanced Materials

(JAMS)

Un. of Washington (Co-Lead)
 Wichita State Un. (Co-Lead)

Edmonds Community College
 Florida International Un.
 Northwestern Un.
 Purdue Un.
 Oregon State Un.
 Tuskegee Un.
 Un. of California – LA
 Un. Of California – San Diego
 Un. of Delaware
 Un. of Utah
 Washington State Un.

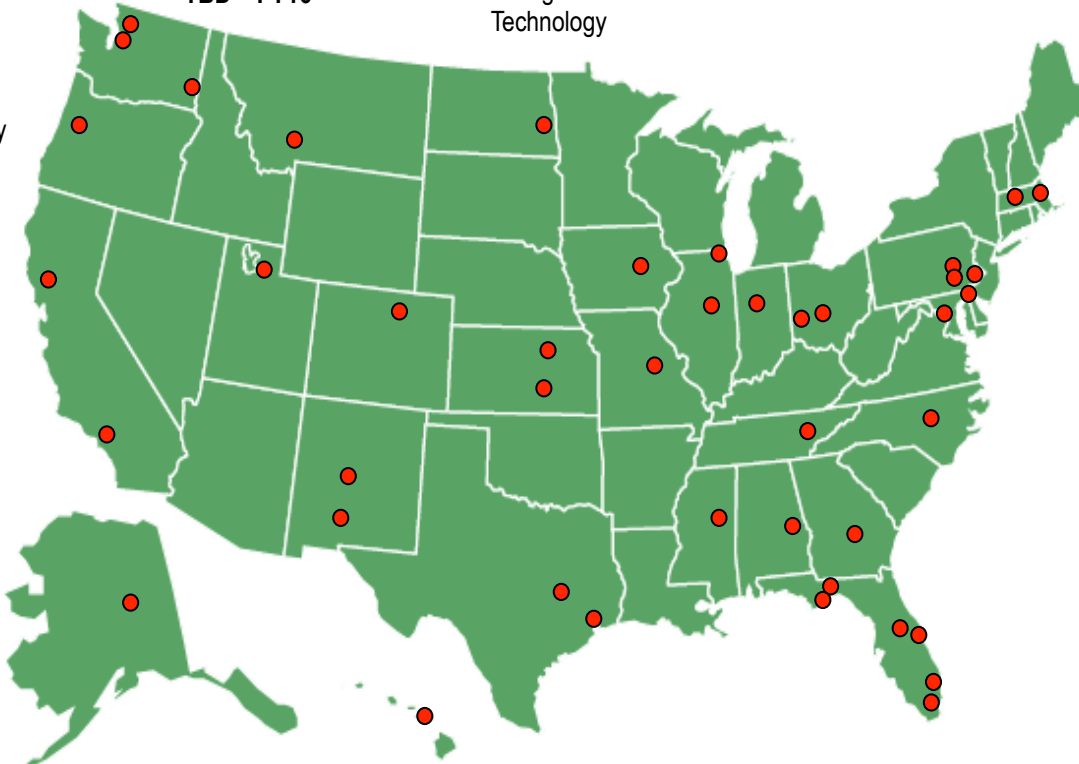
Airliner Cabin Environment-Intermodal Research

(ACERite)

Auburn Un. (Admin Lead)
 Kansas State Un. (Tech Lead)

Unmanned Aircraft Systems (ASSURE)

Mississippi State Un. (Lead)	New Mexico State Un.	Un. of Alabama in Huntsville
Drexel Un.	North Carolina State Un.	Un. of Alaska Fairbanks
Embry Riddle Aeronautical Un.	Oregon State Un.	Un. of California, Davis
Kansas State Un.	The Ohio State Un.	Un. of Kansas
Montana State Un.	Wichita State Un.	Un. of North Dakota



FAA COE Sponsors - Funding Levels

Year	Center of Excellence (Topic Areas)	Sponsor	LOE
2016 - 2021	Technical Training and Human Performance	ATO	\$ 10 M
2015 - 2020	Unmanned Aircraft Systems (UAS) - May 8, 2015	AFS/ANG / HQ	\$ 11 M
2013 - 2023	Alternative Jet Fuels & Environment (AJF&E) – Phase I	AEE / HQ	\$ 40 M
2012 - 2022	General Aviation Safety (PEGASAS) – Phase I	ANG / TC	\$ 16 M
2010 - 2020	Commercial Space Transportation (CST) > Phase II	AST / HQ	\$ 15 M
2004 - present	Research in the Intermodal Transport Environment (ACERite)	AAM / HQ	\$ 49 M
2004 - present	Joint COE Advanced Materials (JAMS)	ANG / TC	\$ 56 M
2003 - present	Aircraft Noise and Emissions Mitigation * (PARTNER)	AEE /HQ	\$ 112 M
2001 - 2014	General Aviation * (CGAR)	ANG / TC	\$ 39 M
1997 - 2007	Airworthiness Assurance * (AACE)	AAR/ANG / TC	\$ 124 M
1996 – (2007)	Operations Research * (NEXTOR)	ARA / HQ	\$ 45 M
1995 - (2013)	Airport Technology (CEAT)	AAR/AIP / TC	\$ 42 M
1992 - 1996	Computational Modeling of Aircraft Structures (CMAS)	AAR / TC	\$ 10 M
NOTE: Figures includes Grants & Matching Contributions; Interagency Agreements and * Contracts		Total	>\$ 560 M



COE University Members (1 of 2)



Andrew Leonard, UND
COE for General Aviation

2010 DOT FAA COE
Student of the Year

John Porcari
Deputy Sec. of Transportation w/
Chelsea He, MIT
COE for Noise & Emissions

2011 DOT FAA COE
Student of the Year



Auburn University
Boise State University
Boston University
Drexel University
Edmonds Community College
Embry-Riddle Aeronautical University
Florida Institute of Technology
Florida International University
Florida State University
Georgia Institute of Technology
Harvard University
Iowa State University
Kansas State University
Massachusetts Institute of Technology
Mississippi State University
Montana State University
New Mexico Inst. of Mining & Tech
New Mexico State University
Northwestern University
Oregon State University
Pennsylvania State University
Purdue University
Rensselaer Polytechnic Institute
Stanford University

COE University Members (2 of 2)



Phillip Donovan, UIUC
COE for Airport Technology

2009 DOT FAA COE
Student of the Year

Gregory D. Winfree
Deputy Administrator, RITA w/
Bradley Cheetham, Un. of Colorado at Boulder
COE for Commercial Space Transportation

2012 DOT FAA COE
Student of the Year



- Texas A&M University
- The Ohio State University
- Tuskegee University
- University of Alaska at Anchorage
- University of Alaska at Fairbanks
- University of California at Los Angeles
- University of Central Florida
- University of Colorado at Boulder
- University of Delaware
- University of Florida
- University of Illinois at Urbana Champaign
- Un. of Medicine & Dentistry of NJ
- University of Missouri at Rolla
- University of North Dakota
- University of North Carolina at Chapel Hill
- University of Pennsylvania
- University of Texas Medical Branch
- University of Utah
- University of Washington
- Washington State University
- Wichita State University

COE Non-Federal Co-Sponsors (1 of 2)

AAS Corp
Adacel
Adaptive Aerospace Group, Inc.
Advanced Transportation R&E
Laboratory (ATREL)
Aegis Technologies
Aero Shell
AeroClave
Aerodyne Research Inc.
Aeroenvironment, Inc.
Ag TechInventure
Air Force Research Laboratory
Air Tran Airways
Air Transport Association of America
(ATA)
Airborne Express
Airbus Industries
Aircraft Owners & Pilots Association
(AOPA)
Airline Pilots Association (APA)
Airports Council International –
North America
Alaska Airmen's Association
Alaska Airways

Alaska Science and Technology
Alcoa Technical Center
AlliedSignal
Allison Engine Company
Aloha Airlines
Altavian
American Airlines
American Eagle Airlines, Inc.
American Institute of Aeronautics
and Astronautics (AIAA)
ARINC Dayton
Aurora Flight Sciences
Ausley Associations, Inc.
Avion Solutions, Inc.
Battelle
Bell Helicopter TEXTRON
BF Goodrich R&D Center
Boeing Company
Bombardier Aerospace-Learjet
Brock Technologies
Brookhaven National Lab
California DOT
Cape Air
Cessna Aircraft
Chicago O'Hare International Airport
Cirrus Aviation

Comair, Inc.
Continental Airlines
Collinear Group
Corsair Engineering
Delta Airlines
Donaldson Company, Inc.
Draper Laboratory
Ecole de technologie superieure
Elite Air Center
Embraer Aircraft Holdings
Emergency Service Unmanned
Support, Inc
Executive Jet Aviation
Excelis
Experimental Aircraft Assoc. (EAA)
FedEx Corporation
Frasca International
Freewave
Futron Corporation
General Atomics Aeronautical
General Dynamics Info Tech
General Electric Company
General Aviation Mfg. Assn. (GAMA)
Goodrich
Gulfstream Aerospace Corporation
Harris Corporation

Honeywell
Illinois Department of Aeronautics
Indiana Department of
Transportation
International Centre for Indoor
Environment & Energy, Technical
University of Denmark
ISR Group
JENTEK Sensors, Inc.
K2Share, LLC
KSI Data Sciences
KUTTA Technologies
L3 Unmanned Systems
Livermore Software Technology
Corp.
Lockheed Martin Aeronautics Co.
Lone Star UAS
Los Angeles World Airports
Lufthansa
Marinvent Corporation
Maryland Aviation Administration
Massachusetts Port Authority
McDonnell Douglas Aerospace
Metron Aviation, Inc.
Metropolitan Washington Airport
Authority
Mid-Atlantic Aviation Partnership
Momentum Aviation Group
Mosaic ATM, Inc.

COE Non-Federal Co-Sponsors (2 of 2)

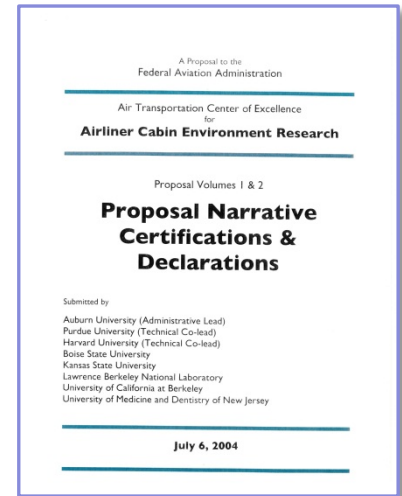
MTSI
NASA
National Business Aviation Assn.
(NBAA)
Navy Meteorology and
Oceanographic Command
Navmar Applied Sciences Corp
Navy Research Labs
NMS Bio-Defense
NOAA
Northern Plains UAS Test Site
Northrop Grumman Corporation
Northwest Airlines
Northwest Composites
O'Hare Modernization Program
(OMP)
O'Hare Noise Compatibility
Commission
Ohio Department of Development
Ohio Department of Transportation
Pentagon Performance, Inc.
Pratt & Whitney
Precision Hawk
Prioria
Professional Flight Attendants
Association
Raytheon Aircraft Company

Regional Airport Authority of
Louisville and Jefferson County
Rockwell International
Rolls Royce
RT Collins
RT Logic
RTCA, Inc.
SAE International
San Francisco Inter. Airport/
Community Roundtable
Sandia National Laboratories
Scitor Corporation
Sebring Airport Authority
Seagull Technology
Selex Galileo
Sierra Nevada Corporation
Sikorsky Aircraft
Simulzye
Southern Air Transport
Southern California Association of
Governments
Southwest Innovation Cluster
Southwest Research Institute
Spirit Aerosystems
Spitfire Aviation Partners
SRI International
Stark Aerospace
STERIS Corporation

Sun Microsystems
Textron Aviation
The Aerospace Corporation
The Northeast UAS Airspace
Integration Research Alliance
The Pan Pacific UAS Test Range
Complex
TKDA
Torch Technology
Transport Canada
Trimble
United Airlines
United Parcel Service
University of San Francisco De
Quito
Unmanned Experts
URS
US Airways
US DOT Volpe National Trans.
Systems Center
US EPA
US Geological Survey
VectorCSP
Virginia Department of
Transportation
Wyle Laboratories

Center of Excellence Benefits

- **Promote** academic, government & industry scientific networks prepared to enhance the safety, security & efficiency of the national airspace system
- **Augment** government resources (\$:\$) and leverage funds through flexible and responsive public/private partnerships
- **Expand** the U.S. math & science pipeline, support STEM goals, and facilitate aerospace recruitment opportunities
- **Provide** a formal strategy & trusted structure to coordinate a national research agenda and related education, and training
- **Advance** U.S. technology and expertise while satisfying Congressional mandate



“The nation must immediately reverse the decline in and promote the growth of a scientifically and technologically trained U.S. aerospace workforce.”

PART II

Significant Research Results

COE Advanced Materials

Projects

Your Brag Book !

COE Partnerships, Affiliations, Collaborations

- The COE – Edmunds Community College developed and held workshops in collaboration with _____ entitled

”



Major COE Sponsor-Funded Tasks

- Boeing Funded Projects at

- Other



COE Student / Faculty Outreach

- DOT FAA COE Outstanding Student of the Year 2014:Wichita State University, Matt Oplinger

Other awards.....

*DOT FAA COE Outstanding Student of the Year
January 2014
Matt Oplinger - Wichita State University*





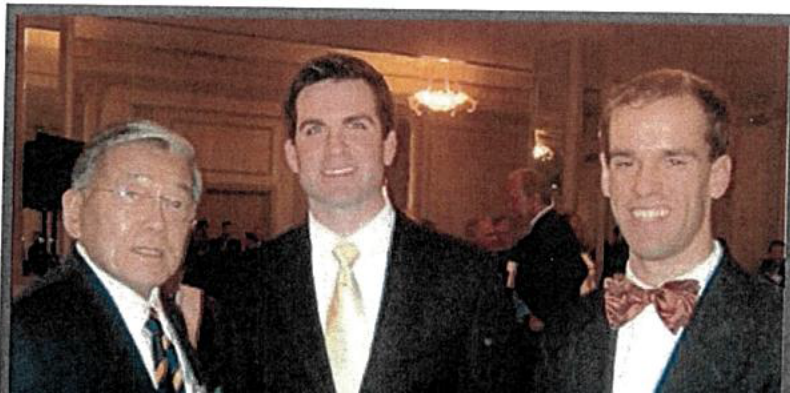
FocusFAA

Student of the Year Awards Highlight Annual TRB Conference

February 10, 2014 – Two stellar graduate-level students from the FAA's Air Transportation Centers of Excellence (COE) program were among 33 individuals honored at the DOT's 23rd Annual Student of the Year Awards ceremony in Washington, D.C.

Matthew Opliger from Wichita State University (WSU) and Philip James Wolfe from the Massachusetts Institute of Technology (MIT) received the prestigious honor, along with 30 students who represented each participating DOT university transportation center.

Opliger served as a research engineer and program manager in the composites laboratory at the National Institute for Aviation Research while studying and earning both his undergraduate and master's degrees at WSU. He conducted research and has managed the lab full-time since graduating magna cum laude with a bachelor's degree in aerospace engineering in 2007.



Opliger then began working toward a master's degree in aerospace engineering at WSU, while also conducting his FAA Joint Center of Excellence for

Significant Results of COE Efforts

Partnerships, Affiliations, Collaborations (cont'd)

SAMPLE – Quad Chart or Highlights

Collaborators: NASA GRC, NASA DFRC, Boeing w Auburn Univ, Kansas State Univ, Boise State Univ, and Rutgers University



<http://www.aerotechnews.com>

- Importance: The NASA VIPR Program is enabling Boeing and the COE to quantitatively characterize the degradation of bleed air quality during simulations of bleed air events by injecting small amounts of engine oil into the compressor of a full-scale P&W engine.

Significant Results of COE Efforts

Partnerships, Affiliations, Collaborations (cont'd) **SAMPLE**

- Danish Technical University, Lawrence Livermore National Laboratories, Harvard University, Boeing Corporation
- **Importance:** The studies alerted us, for the first time, to how humans serve as large ozone sinks. Skin oils, squalene and unsaturated fatty acids were shown to rapidly react with ozone forming a series of products including acetone, formaldehyde, 6-methyl-5-heptene-2-one (6-MHO), geranyl acetone and 4-oxopentanal (4-OPA). These appear to be irritating at elevated concentrations and may contribute to air quality complaints on aircraft, as document in the aircraft simulation studies. We measured the presence of a number of these compounds in aircraft.

Significant Results of COE Efforts

Partnerships, Affiliations, Collaborations **sample**

- Harvard University and Rutgers University Collaboration
- **Importance:** Polybrominated diphenyl ethers (PBDEs) are extensively used on material in the aircraft cabin environment due to the real concern of surviving fires if they occur on aircraft. However, PBDEs have developmental reproductive and neurotoxic effects and are endocrine disruptors. More fundamental information is needed on the emission rates of PBDEs from aircraft materials are needed to establish the exposure and potential health concerns of flight crew and passengers.

Significant Research Results **sample**

Project Title: Disease Transmission

Objective(s): Characterizing influenza transmission and microbe survival on surfaces



Project Detail

- PI: J.D. Spengler
Harvard University
- Total Funds Awarded: \$180,000 + \$193,271
- Status: Complete

Research Accomplishments

- “Development and Performance Evaluation of an Exhaled-Breath Bioaerosol Collector for Influenza Virus” was published in January 2013 in the journal *Aerosol Science and Technology* (47:444-451, 2013).
- “Influenza Virus Aerosols in Human Exhaled Breath: Particle Size, Culturability, and Effect of Surgical Masks” was published in the journal *PLOS Pathogens* on March 7, 2013.

FAA Air Transportation Centers of Excellence



Contact:

Patricia Watts, Ph.D.

FAA William J. Hughes Technical Center, ANG-A12

Atlantic City International Airport, NJ 08405

Phone: (609) 485-5043

Email: patricia.watts@faa.gov

Website: <http://www.faa.gov/go/coe>



COE Life Cycles - June 2014

