Federal Aviation Administration

Center of Excellence
For
Unmanned Aircraft Systems

Final Solicitation

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Issued by the:
Federal Aviation Administration
Centers of Excellence Program Office
FAA William J. Hughes Technical Center
Atlantic City International Airport, NJ 08405

www.faa.gov/go/coe

Table of Contents

OVERVIEW

The Federal Aviation Administration (FAA) intends to establish a Center of Excellence (COE) for Unmanned Aircraft Systems (UAS) in fiscal year 2015. The goal of this endeavor is to create a cost sharing relationship between academia, industry, and government that will focus on research areas of primary interest to the FAA and the U.S. unmanned aircraft systems community.

Our purpose is to forge a union of public sector (FAA, National Aeronautics and Space Administration, Department of Defense, state/local governments, etc.), private sector, and academic institutions to create a world-class consortium that will identify solutions for existing and anticipated UAS related issues. The FAA expects the COE to perform short- and long-term basic and applied research through a variety of analyses, development, and prototyping activities.

To this end, the FAA Centers of Excellence Program Office, ANG-E4, is soliciting proposals from accredited institutions of higher education with their partners and affiliates. The FAA intends to enter into cooperative agreements with core university members, and will award matching grants for public benefit. Initially, grants will be awarded to university members to establish the COE, define the research agenda, and begin UAS research, education, training and related activities.

As a result of this competitive process, the FAA also plans to award indefinite delivery indefinite quantity (IDIQ) contracts to the selected COE team members for the benefit of the government. Thereafter, the COE team will be positioned to receive delivery order tasks on a cost reimbursement, cost sharing, and/or fixed price basis.

In response to this Solicitation, COE proposing lead universities must declare their intention to submit a proposal and identify the core university team and other university, corporate, and affiliate members. Notices of intent must be sent to Patricia.Watts@faa.gov and be received by noon, EDT, on August 22, 2014.

The Office of Primary Interest (OPI) for the COE for UAS is the Research and Development Integration Division, ANG-C2. Government organizations and private companies have indicated an interest in working with the FAA OPI and the selected COE team. These entities may contribute funds and other resources as co-sponsors of this Center. The FAA intends to support this COE over the next ten years at a minimum funding level of $500,000 per year.

FAA CENTERS OF EXCELLENCE PROGRAM

Authorized under Public Law 101-508, the FAA has long had successful partnerships with the nation's academic research community, working with U.S. colleges and universities to foster research by COE faculty and students, industry, and other affiliates. These research efforts have provided the agency and the industry a high return on investments and have contributed significantly to the advancement of aviation science and technology over the past two decades.

Background

Through the COE business strategy and structure, the FAA enhances internal research efforts by accessing the talent of nationally recognized academic and industry research scientists. By establishing major research centers throughout the U.S., the agency complies with Congressional intent and proactively: creates a pool of technical professionals trained in critical research areas; fosters cooperative public / private research and development (R&D) efforts; and strategically facilitates outreach, information dissemination efforts, and technology transfer.

The COEs are required by Congress to match federal grants awarded for public purpose to *establish, operate and conduct research*. These non-federal contributions solidify a significant partnership between the COE members and the FAA. They enable the government, academic institutions, and industry to leverage their combined resources to expand and coordinate aviation related research while maximizing the technological competence of each.

The FAA also may award contracts to the successful applicant as a result of the COE competitive process. This authority gives the COE the latitude to take basic research and continue to develop multiple forms of analyses, applications, and prototyping activities, and thereby require deliverables and provide products for the benefit of the agency as needed.

Researchers may be drawn from COE faculty and students at academic institutions, other organizations, the FAA, and other government agencies. They may perform their work at a college or university, an FAA location, an industry location, or an appropriate facility agreed upon by the parties involved.

Each selected educational institution enters into a long-term cooperative agreement to conduct critical research and related COE activities in areas of importance to the FAA's mission and long-term vision. To foster the terms of the cooperative agreement, researchers provide technical expertise to relevant FAA projects and participate on major planning and investigative committees. They are required to conduct annual research reviews, actively participate in joint COE conferences, host seminars and reviews to disseminate research results, and comply with statutory mandates.

Each proposing team designates one academic institution to serve as the Lead for the COE members. During the proposal period, this university is responsible for combining the input of each member and all affiliates and submitting the application materials in accordance with the procedures described in this document. Applicants are required to show the combined facilities; equipment; matching commitments from industry affiliates, state and local governments, and other non-federal sources; and financial and other resources that are being made available to meet statutory requirements. Confirmation of commitments and letters of support are to be included in the proposal submission.

Proposals are reviewed and evaluated on a competitive basis by a panel of subject matter experts (SMEs) and management officials. Each proposal is evaluated to determine the extent to which academic institutions with their team members and affiliates are able to provide an appropriate environment for the research activities specified and to assure the FAA Administrator that each team being considered meets the selection criteria mandated by Congress.

As stated in Public Law 101-508, 49 USC 44513, institutions being considered for selection as a COE must demonstrate to the FAA Administrator their ability to meet the following criteria:

- *The extent to which the needs of the State in which the applicant is located are representative of the needs of the region for improved air transportation services and facilities.*
- *The demonstrated research and extension resources available to the applicant to carry out this section.*
- *The ability of the applicant to provide leadership in making national and regional contributions to the solution of both long-range and immediate air transportation problems.*
- *The extent to which the applicant has an established air transportation program.*
- *The demonstrated ability of the applicant to disseminate results of air transportation research and educational programs through a statewide or regionwide continuing education program.*
- *The projects the applicant proposes to carry out under the grant.*

Please Note:

1. Following the selection of the COE team, the FAA will define actual projects with university members and will determine funding levels for each activity.
2. The specific tasks will be funded following further discussions, proposal submission, and evaluation. Tasks will be supported on an ongoing basis throughout the life of the COE.

In addition to the selection criteria quoted above, P.L. 101-508 also states:

(1) GENERAL AUTHORITY - The Administrator may make grants to one or more colleges or universities to establish and operate several regional centers of air transportation excellence, whose locations shall be geographically equitable.

(7) ALLOCATION OF FUNDS - Funds made available to carry out this subsection shall be allocated by the Administrator in a geographically equitable manner.

Questions

The period of public comment has closed. However, questions related specifically to the COE for UAS application process may be submitted to the COE Program Director in writing through September 9 and will be answered officially in writing and posted on the COE website. COE Program related questions submitted and answered are updated on a weekly basis and made available on the FAA COE website at: http://www.faa.gov/go/coe.

STATEMENT OF OBJECTIVES

Purpose

The purpose of this section is to provide the research statement of objectives that the applicants must discuss in their proposals to address evaluation *Criterion 6: The projects the applicant proposes to carry out under the grant.*

Background

On March 13, 2014, the FAA Administrator concurred with a request to establish a Center of Excellence for Unmanned Aircraft Systems. COE research scientists will conduct research and related activities expected to result in recommendations for airspace designation for manned and unmanned flight operations, conduct research to support UAS interagency requirements, coordinate R&D activities with other agencies, and provide recommendations on system performance requirements. The COE will enhance the FAA's UAS research efforts by providing access to the various talents of nationally recognized academic-research scientists. This effort is in support of the FAA's goal to ensure the safe and efficient integration of UAS into the National Airspace System (NAS), thus enabling this emerging technology to safely achieve its full potential.

Scope

The selected COE will perform research to assist the FAA and the UAS community to integrate unmanned aircraft into the NAS. The FAA needs to identify and develop criteria and standards required for the civil certification and regulations of UAS pilots, equipment and operations. The research areas presented are examples of the challenges that the FAA needs to address to achieve safe, efficient, and timely UAS integration into the NAS.

As outlined in the evaluation criteria, the COE applicants must address the research areas and respond based on their backgrounds, areas of expertise/specialty, experience with UAS research capabilities, and other factors which would influence their ability to perform research in support of the FAA's UAS integration effort.

Each applicant should consider the systems engineering impact. This is needed across the COE efforts to ensure integration of research efforts among task areas to enable the safe, efficient, and timely integration of UAS. This systems engineering approach should consider applicable requirements, constraints, and systems within the NAS.

Research Areas

The FAA conducts research to revise the UAS Roadmap and to support UAS integration (http://www.faa.gov/uas/media/UAS_Roadmap_2013.pdf). Consequently, the research conducted by the COE should be consistent with this philosophy. Additionally, the FAA will coordinate with the COE to ensure the research aligns with the UAS Civil Integration Roadmap, the FAA's established portfolio of UAS R&D requirements, and concept-level requirements. The Roadmap may be found at the following website: http://www.faa.gov/uas/publications/.

The FAA has identified initial COE research areas of current interest which may evolve over time to adapt to the needs of the NAS.

1. Air Traffic Control Interoperability
2. Airport Ground Operations
3. Control and Communication
4. Detect and Avoid (DAA)
5. Human Factors
6. Low Altitude Operations Safety
7. Noise Reduction
8. Spectrum Management
9. Unmanned Aircraft (UA) Crew Training and Certification, Including Pilots
10. Unmanned Aircraft Systems Traffic Management
11. UAS Wake Separation Standards for UAS Integration into the NAS

Air Traffic Control Interoperability - The overall level of safety in the NAS is preserved through NAS integration, which requires adherence to rigorous airworthiness standards and airspace regulations. While they apply equally to manned aircraft, they also recognize the distinguishing characteristics of UAS. FAA goals for Air Traffic Control (ATC) Interoperability include:

- Research that validates the required functional and performance capabilities for safe operation of UAS within the various airspaces of the NAS
- Assessing ATC interoperability requirements that will be allocated to appropriate air traffic program and UAS integration efforts
- Employing existing strategies to conduct UAS integration safety analysis within Safety Management System (SMS) Manual guidance supporting ATC interoperability http://www.faa.gov/about/initiatives/sms/reference_library/policy_and_requirements/)

- Research on Detect and Avoid algorithms for interoperability with evolving Next Generation Air Transportation System (NextGen) ATC systems and manned collision avoidance systems
- Research on Air Traffic Controller training as it relates to UAS

Airport Ground Operations – This research encompasses those UAS that operate like fixed wing manned aircraft that require use of ramps, taxiways and runways to complete ground operations. This UAS research will evaluate the Pilot In Command's (PIC) ability to read and interpret airfield markings and signage, including but not limited to, runway and taxiway signage. Additionally, it will assess UAS compliance with ATC instruction in the airport environment. For example, ATC instructions would also include a clearance to follow, pass behind, pass in front of, or give way to another aircraft or vehicles on the taxiway or airport ramp area. This research considers:

- Identifying operational and communication challenges, and compliance of unmanned aircraft in the airport ground operations environment
- Determine runway occupancy times of different UAS categories
- Determine aircraft design characteristics of UAS expected to operate at airports that are part of the National Plan of Integrated Airport Systems (NPIAS).
- Determine facility requirements of UAS operating in an airport environment – hangar, tie-down, ramp facilities, specific ground service equipment requirements

Control and Communication - Control and Communication (C2) research is the development of an appropriate C2 link between the unmanned aircraft and the control station to support the required performance of the unmanned aircraft in the NAS and to ensure that the pilot always maintains a threshold level of control of the aircraft. Research will be conducted for UAS control and non-payload communications (CNPC) data link to determine values for latency, availability, integrity, continuity, and other performance measures. UAS contingency and emergency scenarios also require research (e.g., how will a UAS in the NAS respond when the CNPC link is lost either through equipment malfunction or malicious jamming, etc.). This research will drive standards that are being established through:

- Development and validation of UAS control link prototype
- Assessment of the vulnerability of UAS safety critical communications
- Completion of large-scale simulations and flight testing of initial performance requirements
- Spectrum management, including analyses of potential frequency allocation strategies

Detect and Avoid (DAA) - This research area focuses on issues related to the detection of potential threats to remain well clear and avoid collisions. It explores sensors, the data produced from sensors, the management and use of that data, and the operational outcome that is considered safe and acceptable. It is a stated goal of the FAA to certify an Airborne Sense and Avoid (ABSAA) system that facilitates UAS operations without the requirement for a visual observer. The research objectives of this focus area include:

- Establishment of DAA system definitions and performance levels
- Assessment of DAA system multi-sensor use and other technologies
- Development of the minimum DAA information set required for collision avoidance maneuvering

Human Factors – When the pilot controls the aircraft from a remote control station, several human factors issues emerge with respect to the pilot, the air traffic controller, and their interactions to safely operate UAS in the NAS. Human factors issues in manned aviation are well known, but further analyses regarding integration of UAS into the NAS is required. In the near-term, data will be collected to permit analysis of how pilots fly UAS, how controllers provide service involving a mix of manned aircraft and UAS, and how pilots and controllers interact with each other, with the goal of developing pilot, ATC, and automation roles and responsibilities. The following are interrelated research challenges:

- Effective human-automation interaction (level; trust; and mode awareness)
- Pilot-centric control station design (displays; sensory deficit and remediation; and sterile cockpit)
- Display of traffic/airspace information (separation assurance interface)
- Predictability and contingency management (lost link status, lost ATC communication, and ATC workload)
- Definition of roles and responsibilities (communication flow among crew, ATC, and flight dispatcher)
- NAS human performance requirements

Low Altitude Operations Safety – The substantial increase in air traffic below 400 feet that is expected with the integration of small unmanned aircraft systems (sUAS) in the NAS also significantly raises the exposure of the general population to the potential effects of a sUAS mishap. This research area will focus on:

- Identify the potential hazards associated with sUAS in the low altitude NAS (unshielded rotors, loss of control, hazardous materials, etc.)
- Test and recommend risk mitigation strategies to reduce or eliminate any decrease in safety to the public that might otherwise result from the integration of sUAS in the low altitude NAS

Noise Reduction - Advances in technology have greatly increased the affordability and accessibility of UAS to potential commercial operators and the general public. Accordingly, when the FAA develops and issues regulations that enable the commercial and private operation of sUAS in the NAS below 400 feet, we can expect a significant increase in the number of aircraft operating in this space. In addition to the significant number of new aircraft operating in this space, these sUAS will be operating in airspace that puts them in closer proximity to people than conventional aircraft now operate (currently it is rare for aircraft to operate in this arena). This research focuses on the development and measurement of quieting technology for electric motors, internal combustion motors, rotors, and propellers along with the measurement of existing UAS to understand the potential noise impact of such operations.

Spectrum Management - Advanced research is required in data link management, spectrum analysis, and frequency management. Efforts will focus on completing development of C2 link assurance and mitigation technologies and methods for incorporating them into the development of standards for the certification of the UAS. This will include:

- Identification of satellite communication spectrum from the International Telecommunication Union (ITU) through its World Radio Communication Conference (WRC)
- Verification and validation of control communication final performance requirements
- Establishment of UAS control link national/international standards
- Development and validation of technologies to mitigate vulnerabilities

UAS Crew Training and Certification Including Pilots - The FAA's role in training is to establish policy, guidance, and standards. Airmen training standards are under development and need to be synchronized with the regulatory guidance. This research centers on UAS pilot training and pilot certification and the differences and similarities between manned and unmanned pilot training and certification. It also includes other crewmember certification such as sensor operators and visual observers as well as the role of the mission coordinators. This research includes:

- Developing standards for UAS pilots and other crewmembers
- Defining the knowledge, skills, and abilities required of a UAS pilot in command and other crewmembers such as sensor operators. This would include comparing manned pilot certification with unmanned pilot certification
- Recommended training programs for pilot and other crewmember certification

UAS Traffic Management - Collaborative Decision Making (CDM) is a joint government/industry initiative aimed at improving air traffic flow management through increased information exchange among aviation community stakeholders. These stakeholders work together to create technological and procedural solutions to the Air Traffic Flow Management (ATFM) challenges faced by the NAS. New entrants into the NAS such as UAS are not being considered.

Research is needed to enhance current decision-support and data-sharing tools used by air traffic management personnel for UAS. These enhancements would enable a more collaborative environment among controllers and operators, support UAS integration, and improve efficiency in the NAS. Research areas include:

- Assessing ATFM UAS requirements
- Identifying additional Collaborative Air Traffic Management Technologies (CATMT) for UAS

UAS Wake Separation Standards for UAS Integration into the NAS – The FAA has recently implemented new rules at a number of airports for keeping airplanes far enough apart so they are not affected by each other's wake turbulence. This wake turbulence re-categorization (RECAT) more narrowly and accurately defines safe wake turbulence separation standards based on the performance characteristics of aircraft. This eliminates conservatively long separation standards that are necessary under current broader wake-turbulence classifications, which are based primarily on aircraft weight classes.

Resulting from recent research in wake physics, the new system has six categories that are based on aircraft weight, approach speeds, wing characteristics and other special considerations. Depending on the pairings of leading and trailing aircraft, RECAT requires less or more separation than before or the same amount.

For UAS expected to use the FAA's air traffic services, serious consideration must be taken to minimize the impact of wake turbulence on these lighter weight class aircraft. It is envisioned that some of the possible impacts of hazardous wake encounters for UAS may include: engine failure, temporary loss or total loss of aircraft control, and loss of command and control link resulting in loss of situational awareness by remote pilot and inability to respond to ATC instructions. The research for this focus area includes:

- Use wake encounter reaction models to estimate UAS accelerations (all axes), resulting attitudes, and G-loads resulting from encounters with wakes from a variety of generating aircraft
- Evaluate each UAS (or perhaps groups of similar type) for specific reactions (attitudes and altitude excursions) when encountering various wake strengths at a range of encounter geometries
- Evaluate onboard attitude control logic for ability to return to normal controlled flight from wake encounter induced unusual attitudes
- Use wake models to estimate the strength of wakes generated by UAS at different speeds and configurations

EVALUATION CRITERIA

This Center of Excellence will be selected based on the formal evaluation criteria set forth in Public Law 101-508, 49 U.S.C. 44513. Each applicant is requested to equally address the individual evaluation factors, which are the sole basis for the selection.

The italicized text used throughout this document is language quoted from the enabling legislation and it is unchanged. Where the phrase "Air Transportation" is used, assume the meaning to pertain to UAS as appropriate within the scope of FAA responsibilities.

Criterion 1: ***The extent to which the needs of the state in which the applicant is located are representative of the needs of the region for improved air transportation services and facilities.***

The applicant should demonstrate the following:

- The state and regional UAS commitments, the capabilities and resources which are available to address the current national aviation goal of integrating the UAS into the NAS. The positive impact the COE as a whole is expected to have on the geographic areas of the individual team members.
- The applicants' UAS related experience and the impact these activities have had in using UAS capabilities and resources to support the aviation needs of the state and region.

Criterion 2: ***The demonstrated research and extension resources available to the applicant to carry out this subsection.***

The applicant should demonstrate the following:

- Relevant relationships with members of the aerospace industry, including the ability to partner with test sites for flight testing, the resources and facilities these potential affiliates are positioned to contribute.
- Grants and contracts awarded to the applicant focusing on UAS topics of research over the past five years.
- The availability of laboratory, test, and evaluation facilities, located on-campus and off-campus.
- The human resources available, the knowledge, skills, and experience with UAS operations and research.

Criterion 3: ***The capability of the applicant to provide leadership in making national and regional contributions to the solution of both long-range and immediate air transportation problems.***

The applicant should demonstrate the following:

- Experience with industry and government agencies related to UAS
- High standing within the national and international arena of UAS research as evidenced by presentations at national and international conferences, publications in popular and peer-reviewed periodicals, etc.
- Evidence of ability to satisfy matching requirements, and potential sources of matching contributions, including letters of commitment, etc.
- A proposed plan might include establishing an advisory board comprised of leaders in the field and written commitments from their organizations to be actively engaged in the COE.

Criterion 4: ***The extent to which the applicant has an established air transportation program.***

The applicant should demonstrate the following:

- A history of training personnel in relevant academic fields (e.g., scientists, engineers, pilots, mechanics, etc.) for unmanned aircraft systems
- Curricula in academic fields relevant to the hierarchy of research areas listed in *STATEMENT OF OBJECTIVES*, beginning on page 7
- Number of graduates and placement of students in industry, academia, and government in jobs related to UAS, and the methods the COE will use to collect data on future placement of graduates

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Criterion 5: ***The demonstrated ability of the applicant to disseminate results of the air transportation research and educational programs through a statewide or regionwide continuing education program.***

The applicant should demonstrate:

- Academic programs, such as continuing education, distance learning, etc., that address UAS related topics
- Experience conducting undergraduate and graduate-level courses, seminars, symposia, and workshops related to UAS topics and future plans to conduct such activities
- Experience using the internet and other means to disseminate results of research and enhance educational programs, and evidence of hard and soft publications
- Facilities and other resources currently available, and plans to provide for congressionally mandated COE *information dissemination* activities

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Criterion 6: ***The projects the applicant proposes to carry out under the grant.***

a. Research Plan - It is expected that the research plan will contain at least one project addressing each research area. This plan should attempt to be evenly distributed across the entire spectrum of focus areas listed in *STATEMENT OF OBJECTIVES: Research Areas*, beginning on page 7. The description of each project should be the length of a typical abstract of not more than two pages. The research plan shall not exceed 22 pages of the 60-page limit.

b. Order of Importance - The research areas are not presented in a particular order of importance. If the applicant believes it is appropriate to place more emphasize on one or more of the research areas than the others, a clear rationale for the prioritization is suggested.

Please note: The research projects proposed will not necessarily be funded if the applicant is selected but are presented to be indicative of the applicants' understanding of the relevant issues and research approaches to be taken.

Once a university team has been selected to serve as an Air Transportation Center of Excellence, the FAA sponsor develops a research agenda based on the specific resources and skills provided by the team. Thereafter, university members submit research proposals in their area(s) of expertise. All COE funded projects will be defined, proposed, evaluated, and supported in accordance with the various sponsors' needs on an ongoing basis throughout the life of the COE.

c. Management Plan - The applicant shall submit a plan that reflects management and oversight of the research in UAS focus areas as defined in the scope of work. For page limit guidance, see the chart on page 20.
   - An organization chart, roles and responsibilities, and a description of how the applicant will organize and manage the core team members within the COE.
   - How the applicant will approach, conduct and oversee the research initiatives
   - A narrative to describe the proposed management and oversight of fiscal and technical activities to comply with COE Program standardized reporting requirement
   - How the universities will coordinate research efforts, how research teams will be selected and evaluated, and how the costs of administering the COE will be apportioned and funded

CENTER OPERATIONS

The COE members must maintain close working relationships with the FAA COE Program Office, the Office of Primary Interest, and other sponsoring office(s). This interactive relationship extends to participation in conferences, meetings, joint research efforts, presentations, and the submission of publications, and routine and standardized activity reports for the FAA sponsor and the COE Program Office.

The COE universities are required to track various activities and submit timely reports in compliance with COE Program requirements. These standardized reports include, but are not limited to, research accomplishments; sources and amounts of all funds including matching contributions; fiscal expenditures; placement of COE graduate students; and other information as required by the DOT, the FAA, and the COE Program Office.

During the first year, the COE must submit required reports and meet on a quarterly basis. Thereafter, members are required to submit standardized reports as specified in the cooperative agreement and reference documents, and conduct meetings on a semiannual basis.

In keeping with the Congressional requirement to disseminate information and the interest expressed by the agency to disseminate and use new knowledge, the COE will report on and participate in numerous informational and outreach activities. After the first year, the FAA will require the COE to hold semiannual meetings with agency representatives, COE sponsors, and others on topics relating to the status and results of the designated research.

The COE members will host a major symposium to highlight their research results and their COE activities prior to the end of each five-year phase, and as otherwise agreed upon. The Center is also required to actively participate in FAA joint COE meetings as scheduled.

Additional information dissemination activities may be done in a variety of ways. These might include: continuing education programs focused on the related topics, university technology transfer activities, the conduct of workshops, etc. These activities may also include, but are not limited to:

- Site visits for representatives of key professional, industrial, academic, state or local associations or organizations, members of the media, etc.
- Preparation and publication of course materials, COE related articles, pamphlets, manuals, books, and papers delivered at conferences
- Local, state, or regional meetings
- Demonstrations of new or proposed technology

Please Note: The COE members will not make any presentations, issue news releases, conduct interviews, or engage in any other public interface or written publication that implies FAA involvement or support or attribute conclusions to the FAA without prior written permission of the FAA COE Program Manager, the FAA COE Program Director, and the FAA Office of Communications.

ANNUAL RESEARCH REVIEW

The COE shall host a semiannual review of the research completed and in progress. The semiannual review includes on-site meetings and briefings conducted by appropriate technical and administrative support personnel. The meeting must focus on the relevance, merit, direction, results, costs, and benefits of research, education and related efforts in the designated research area(s), and include a discussion of potential projects and future plans.

Annual Report

The COE shall prepare and deliver to the FAA Centers of Excellence Program Director and to the FAA COE Program Manager a standardized COE annual report. The report shall include: research results, benefits, and information dissemination efforts; the sources and value of matching contributions; the name and national origin of all research personnel, and actual and intended graduation dates of students; significant events that were sponsored by partners or affiliates or attended by faculty and students; journal articles and conference proceedings published throughout the previous year; and a brief description of the research intended to be conducted during the following year. Graphics and photographs, in addition to the narrative descriptions, are highly encouraged. COE universities must also track and report to the FAA COE Program Management Office the placement of students upon completion of their studies.

Duration and Reassessment

The needs of the agency are reviewed annually and the Center is reassessed within the first five years. As a result of changing needs, the agency reserves the right to expand scope, change direction, or terminate COE support for cause. During each scheduled close out period, the FAA makes every effort to assure orderly transition.

COE cooperative agreements are entered into between the core universities and the agency for an initial period of five years. When all members have satisfied matching requirements, and the COE has made changes as may have been suggested by the reassessment team, a Phase II cooperative agreement is negotiated with each core university member in good standing.

Should the evaluation process indicate that the COE has not performed as needed or if the agency is unable to commit to supporting the partnership through the completion of the Phase II period, the COE Program Office will plan for an orderly phase down, and recommend to the FAA Administrator that university members be supported through individual Aviation Research Grants as FAA funds become available. The Administrator determines the final course of action to be taken and provides written guidance to the COE Program Office and sponsor(s).

To satisfy information dissemination requirements, the COE members will provide for a major symposium prior to the end of each Phase. All research projects should be scheduled to be completed within each cooperative agreement period. During the final transition to independence, the FAA takes all measures possible to provide for adequate time to assure project completion and orderly close out of all tasks.

PROPOSAL PREPARATION AND SUBMISSION

To avoid processing delays, the proposal should be reviewed carefully to include all essential data and required forms.

Who Is Eligible To Submit

- Accredited institutions of higher education are eligible to submit proposals to become a core member of the proposed COE. When a team is proposing to serve as a COE, one member must serve as the administrative lead. After the COE is established, the COE members may rotate leadership roles, add, change or redefine member responsibilities throughout the life of the Center.
- Individuals are not eligible for a COE designation and do not qualify for any awards under this program. Graduate students cannot submit proposals, but they are encouraged to serve as research assistants to faculty at member institutions.

Through September 9, written questions regarding the COE UAS application process may be submitted to the FAA Centers of Excellence Program Director, at: Patricia.Watts@faa.gov. Potential applicants and others may communicate in writing only with the COE Program Director during the application and selection process. Written questions and answers will be posted on the COE website on a weekly basis.

Please Note: Throughout the competitive process, other than the COE Program Director, FAA employees and contractors may not discuss or take questions regarding technical issues, the competitive process, COE or COE UAS related matters.

When to Submit

Proposals may be submitted after the effective date of the Final Solicitation.

The closing time and date for **delivery** is:

3:00 p.m. Eastern Daylight Time
on September 15, 2014

The FAA COE Program Office will review all submissions as they are received. The COE Program Director may request additional information at any time during the evaluation period and thereafter. Proposals postmarked or received by delivery services such as FedEx, UPS, and DHL - on or before September 14 will be accepted.

What to Submit

The applicant should submit proposals in two volumes: **Volume I** should contain the material that responds to the six selection criteria including the technical proposal and the management plan; **Volume II** should contain the forms, audit reports, Certifications and Declarations, etc. Proposals may be fixed in the upper left hand corner; if unbound, submit materials in binders that are easily separated.

Margins should be 1 inch at the top, bottom and on each side, and text should be in 12 point Times New Roman font. Pages must be numbered at the bottom. Print the original narrative and forms with signatures as appropriate single-sided, and clearly mark these volumes as ***Original***. Additional copies of the proposal and forms may be printed on both sides.

Six copies of each proposal must be submitted in addition to the original. Applicants must also include an electronic copy of all submitted materials on a clearly labeled USB flash drive. The digital files should be appropriately identified. Attach reprints, appendices or other materials to be considered with the proposal to each individual copy of the proposal.

The Omnibus Trade and Competitiveness Act of 1988 requires federal agencies to use the metric system in procurement, grants, and other business-related activities. Proposals for grants submitted to the FAA are required to use the metric system of weights and measures. Likewise, reports, publications, and communiqués regarding proposals are required to use metric units.

The FAA is not responsible for proposal preparation expenditures incurred by the proposing organizations.

Assemble proposals with tabs and present material in the order outlined below:

A. Cover Letter. The Lead COE University representative must affix a standard cover letter to the front of the proposal submission package.

a. The cover letter must be signed by an official authorized to commit the university to this course of action, the individual serving as the main principal investigator/main technical contact, and a senior level officer at the lead institution.
b. Additionally, each core university member must provide a letter signed by the fiscal officer, technical point of contact, and senior officer indicating their intention to serve on the COE team. These letters are to be included in Section 3.

B. Evaluation Grid. The 11” x 17” form is provided as a convenience for the applicant and the evaluation team, and may be filled out and inserted after the cover letter in identifying the exact location of responses to the Evaluation Factors and Selection Criteria. Fold the page inward as needed to accommodate the proposal package. The letters of commitment, those noted above, and this page are NOT counted as part of the narrative 60 page limitation cited below in Volume I. The last column of the Grid (“Additional

References") has been included to accommodate any attached material that the applicant would like to draw to the attention of the evaluators that may further address the Criterion cited.

C. Table of Contents

D. Volume I, Proposal - Limited to **60** pages overall – Narrative, tabulated as follows:

Section 1. Limited to **22** pages - The proposal must consist of narrative statements that address the individual evaluation factors and the six selection criteria established by statute. Of the 60 pages, applicants may submit no more than **22** pages to address the 11 research areas in response to **Criterion 6, page 15.**

Section 2. Suggested **10** pages - Management Plan. The strategic business and financial plan must detail how the lead institution proposes to direct and manage the Center of Excellence team, engage others in generating matching contributions in the short-term, and provide for long-term matching contributions and income from outside sources in order to achieve self-sufficiency within a 10-year period. The plan should include and be tabulated in this order:

1) an organization chart
2) a list of all members and affiliates with a narrative describing the roles and responsibilities of key personnel, industry and other affiliates
3) projected activities to be undertaken during the life of the COE to satisfy Congressional mandates, achieve COE goals and satisfy requirements of the COE and the COE Program overall, and provide for standardized reports and oversight of technical requirements of public and private sponsors, see Criterion 6, page 15

Section 3. No Limit - Letters of Commitment. Provide letters of commitment from all team members and other proposed sources.

Section 4. No Limit - Include curriculum vitae for Center Lead and key staff at core member universities. These profiles are limited to two pages per individual, plus the list of published papers.

The following table is an aid in formulating and constructing the response for Volume 1.

Response		**Page Count**	**Page Limit**
Section 1:	Criteria 1 – 5*	~ 5 pages each (suggested)	25
	Criterion 6 (11 Research Areas)	No more than 2 pages each	22
Section 2:	Management Plan*	~ 10 pages total (suggested)	10
		Total	57
Proposal – Volume 1		**Total**	**60**

*Three pages may be applied to further expand these elements.

E. Volume II, Certifications and Declarations. No Overall Page Limit. This volume consists of the following items which have been prepared by the lead university and tabulated in this order:

Section 1.

(1) Anticipated Research and Related Budget. Provide a narrative, limited to no more than five pages, to support the costs and matching contributions anticipated over the first two years. Using the FAA stated annual research commitment and the anticipated matching contributions provide a general estimate of: start-up costs; expected travel plans and costs; and to preliminary research being proposed and expected to be conducted in specialty areas of core members.

Section 2.

(1) Standard Form 424, Application for Federal Assistance. The original must be signed by the authorized Organizational Representative at each Core Member university.
(2) Research and Related Federal and Non Federal Budget form - include both FAA award and matching contributions anticipated and potential sources.
(3) Project/Performance Site Locations of each Core member
(4) Indirect Cost Agreement. Provide a copy of the latest institutional indirect cost agreement negotiated and in force with the lead institution's cognizant federal audit agency and overhead rate at each core university (Department of Health and Human Services, Department of Defense, or other).

Please Note: All universities serving on the selected COE team will be required to provide copies of their indirect cost agreements.

(5) A copy of the core universities' latest institutional audit report or final letter. Each core university must also include: 1) the name and telephone number of the cognizant federal auditing agency representative or auditing firm and 2) the same contact information for the university fiscal officer.

Please Note: Members of the selected COE team will be asked to provide additional forms and full audit reports. COE members will be required to provide documentation of actions taken to address audit findings where they might have existed.

Applicants must ensure that the costs the FAA is being asked to support are allowable, necessary, and reasonable and that the treatments of direct and indirect costs in the budget are consistent with applicable federal cost principles and with the policies of the submitting organizations.

Where to Submit

Send original proposal plus six copies and the USB flash drive to:

Patricia Watts, Ph.D.
Director, Centers of Excellence Program
Federal Aviation Administration
William J. Hughes Technical Center
ANG-E4, Fourth Floor, L-28
Atlantic City International Airport, NJ 08405

The outside of each mailed package should be clearly marked:
Center of Excellence Proposal Submission – Time Sensitive

Please Note: Proposals **must** also be submitted through Grants.gov.

Please notify the COE Program Office through email (Patricia.Watts@faa.gov) when the proposal is sent, the method of shipment, and the tracking number if applicable.

PROPOSAL PROCESSING AND EVALUATION

Acknowledgment

The COE Program Office will assign a proposal number to each submission and acknowledge receipt.

Review

The COE Program Management office will review each submission as received.

Evaluation/Review

- A team of subject matter experts will evaluate each proposal to assure that the FAA technical evaluation factors are fully addressed and to determine the extent to which the selection criteria can be satisfied by all proposed members. The evaluation team will consist of five individuals from within the federal government with expertise in the various topic areas. The team leader will be responsible for developing an executive summary of the overall findings based on evaluations of the team members.

- During the evaluation process, the FAA COE Program Office will also establish a team to conduct a Management and Fiscal review of each proposal. The review team will consist of federal employees with expertise in management and fiscal matters. The team leader will be responsible for developing an overall summary based on the input of the team members.

- The FAA sponsoring organization and COE Program Office may conduct site visits to inspect available resources prior to finalizing the evaluation process.

- The FAA COE Program Director may contact the proposing organizations at any time to discuss the submission or to request further information to assist in assessing a proposal.

Please Note: During the selection process, with the exception of the FAA COE Program Director, discussions regarding technical issues, program requirements or the competitive process are not permitted between the proposing organizations, the sponsoring organization(s), support staff or others involved in the process.

Ineligible Proposals

Proposals determined to be incomplete or ineligible for consideration under this solicitation will be returned to the applicant with a written explanation.

Withdrawal

A proposing institution may withdraw a proposal at any time prior to award.

GRANT AWARD AND ADMINISTRATION

Types of Awards

COE Cooperative Agreement

This agreement specifies terms and conditions of the initial five-year period of award in keeping with Congressional requirements, the COE must match federal funds awarded to *establish*, *operate* and *conduct related research* within each cooperative agreement period. Once the FAA Administrator announces the selection of the COE team, the COE Program Director will enter into a cooperative agreement with the responsible fiscal officer at each university. Funds are granted in the form of amendments to each COE cooperative agreement over the life of the COE.

Grant

A grant is the basic award instrument which the FAA may use to support activities at a specific level of effort and period of time with no statement of FAA intent to provide additional future support. Grant awards are made for public purpose and under the COE statute, must be matched.

The OPI establishes the overall level of effort for the COE and develops long-term fiscal plans to support the COE research, education, training and related activities and satisfy the annual funding commitments. These plans are coordinated within the agency with appropriate offices as an annual priority.

The award instruments will be issued by the COE Grants Officer as an amendment to the COE cooperative agreement and will contain all documentation applicable to the award and administration of the COE grants. The FAA encourages, but does not require, the COE members to generate matching contributions on a task-by-task basis.

Administration

Program guidance is provided in the COE cooperative agreement and the COE Policy Guide. The conditions and provisions of the initial COE cooperative agreement and the subsequent award instruments govern the administration of grant funds awarded through the COE Program Office. FAA Order 9550.7A provides fiscal guidance for universities from point-of-award through close out.

The FAA COE Grants Officer may make direct awards at any time to universities, COE partners, and affiliates for the convenience of the government.

Please Note: Only officially designated and certified fiscal officers within the FAA are authorized to commit FAA funds and to permit FAA supported projects to be initiated with universities and their affiliates.

Direct Awards

When several universities submit a joint proposal to establish a COE and a team submission is selected, grants and contracts to university partners will be awarded directly to each member. Awards will be made to COE core members and affiliates as necessary without further competition during the term of the cooperative agreement.

Required Forms* and Materials

The attached forms and materials are required when submitting grant proposals.

- Standard Form 424, Application for Federal Assistance
- Research and Related Budget
- Research and Related Federal and Non-Federal Budget
- Project/Performance Site Locations
- Indirect Cost Agreement
- Copy of the core universities' latest institutional audit report or letter
- Project Participants Form

* The required forms will be listed, updated as necessary, and posted on the COE website.

E-Grants and Additional Information

For additional information regarding the FAA Air Transportation Centers of Excellence Program, the electronic grants application system and process, and the standardized COE reporting requirements, see the COE website at: www.faa.gov/go/coe.

APPENDIX

Checklist for COE Proposal Submission

Please Note: Properly sequenced, tabulated, and completed proposals expedite processing and facilitate the review process. Use this checklist to ensure that a complete proposal is submitted.

Details of the following required elements are found within this solicitation.

_____ Cover Letter

_____ Completed Evaluation Grid

Volume I, Proposal Narrative

_____ Statement in response to the Evaluation Factors –
Limited to 60 pages total: Criterion 6 may be no more than 22 pages

_____ Management plan and a proposed three-year budget and narrative - Limited to approximately 10 pages

_____ Letters of Commitment – No Limit. Submit a letter from each core university team member, non-federal affiliates, and others expected to support and work with the COE

_____ Research and Related Senior/Key Person Profile

Volume II, Forms, Reports, Certifications and Declarations

_____ Cover Sheet for Proposals - Application for Federal Assistance SF-424

_____ Project/Performance Site Locations

_____ Indirect Cost Agreements, Audit Reports, other attachments or forms to support proposal narrative

See Grants.gov for additional forms required of the selected team members at the time of announcement.