

PART I - SECTION C STATEMENT OF WORK

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C.1 GENERAL

C.1.1 Objective

The objective of this contract is to establish a Cost Plus Fixed Fee, Level of Effort, Task Order, Term Type contract for National Airspace System (NAS) support services that will enable the Federal Aviation Administration (FAA) program offices to accomplish their mission objectives. Since the NAS encompasses far more than the FAA's infrastructure, this contract allows for studies of systems that may never be owned by the FAA. The resulting contract is designed to provide a broad range of Research and Mission Analysis support services, with a caveat to allow for Systems Engineering work that may not fall under the guise of the FAA's Acquisition Management System (AMS). The scope further defines this demarcation. This Statement of Work (SOW) is comprised of specific functional task areas that establish the scope of this contract. Specific requirements within the scope of these functional task areas will be identified, defined, and issued under individually funded specific Task Orders.

C.1.2 Background

- (a) With the expected growth in air traffic operations and our aging infrastructure, the FAA, in collaboration with its aviation partners, other federal agencies/departments, foreign entities, and users of the NAS and the larger national air transportation system, has begun the task of transforming the NAS to meet the future demands expected between now and 2025. This effort is called the Next Generation Air Transportation System (NextGen). NextGen goals are laid out in the Integrated National Plan (December 2004) and include: enhancing the passenger experience from curb-to-curb; increasing capacity and efficiency through modernized and near real-time air traffic management capabilities/techniques/procedures; reducing operational ownership costs and environmental impacts; reducing the impact of weather on air travel through a system-wide capability for enhanced weather observations and forecasts; modifying or enhancing existing aircraft certification requirements and regulations; securing and defending the air transportation system against emerging threats; and ensuring our leadership position in managing the safest and most efficient air transportation system in the world.
- (b) In order to accomplish NextGen, as well as other non-NextGen aviation related activities, a portfolio of contract support services vehicles is being let under the title of Systems Engineering 2020 (SE-2020). The scope of the support services of SE-2020 is in direct support of U.S. aeronautics development and the transformation of the national air transportation system through 2020.
- (c) The transformation to this vision will not be made by the FAA alone. It requires other member Federal agencies, as well as partnerships of public sector (FAA, airport authorities, state/local governments, etc.), private sector (airlines, manufacturers, etc.), and academic institutions to create a world-class consortium focused on identifying solutions for implementing NextGen. The FAA is committed to transforming the aviation system in conjunction with the membership of the Joint Planning and Development Office (JPDO).

The JPDO is a multi-agency public/private initiative that includes the Departments of Transportation, Defense, Commerce, and Homeland Security, as well as the FAA, the National Aeronautics and Space Administration (NASA), and the White House Office of Science and Technology Policy (OSTP). The NextGen vision is an integrated evolutionary plan to take the FAA beyond ground-based radar technology and voice direction into the second century of aviation using modern technology; updated procedures and new equipment; satellite-based operations; updated communications and automation; and improved weather and traffic management capabilities. To better understand the JPDO and the organizational entities and cooperation necessary to succeed in this endeavor, see <http://www.jpdo.gov>.

- (d) To realize this vision, the FAA must make coordinated improvements on multiple fronts. The NextGen Implementation Plan will be the mechanism by which the FAA holds itself accountable to its owners, customers, and the aviation community for progress toward the NextGen vision. See <http://www.faa.gov/NextGen>.
- (e) The NAS Enterprise Architecture (EA) aggregates and describes the research and systems needed to achieve the goals of the FAA for the NAS, and serves as the basis to evaluate and document needed upgrades. The NAS EA provides a description of the specific NAS systems and subsystems undergoing research and development, production, or those planned for future development. The NAS Architecture recognizes that maintenance and upgrade efforts of the numerous NAS systems and facilities is a continuing integrated process rather than a singular effort culminating in a final end-state system design. The FAA's NAS Architecture can be found at <http://www.nas-architecture.faa.gov/nas/home.cfm>.

C.2 SCOPE

C.2.1 General

- (a) The Scope of this contract covers the NextGen Research and Mission Analysis activities necessary to reach the Concept and Requirements Definition Readiness Decision as delineated in the FAA's Acquisition Management System (AMS), Sections 2.2 thru 2.3.3. The FAA AMS can be found at: <http://fast.faa.gov/index.html>. This contract does not cover AMS Lifecycle Management activities beyond the Concept and Requirements Definition Readiness Decision. It is intended that this contract remain current and continue to provide the full range of Research and Mission Analysis support capabilities throughout its period of performance for systems that will eventually be under the guise of the AMS.
- (b) The caveat to this demarcation is that this contract will support those aviation activities that do not fall under the guise of the AMS (i.e. all System Engineering activities with examples that include but are not limited to developing standards, policies, published rules, and procedures). It is intended that this contract remain current and continue to provide the full range of lifecycle support capabilities throughout its period of performance for systems that will not be under the guise of the AMS.

- (c) The Contractor must, in response to funded Task Orders issued under this contract, provide the full range of Research and Mission Analysis support services in one or more of the Functional Task Areas listed in Section C.3. The Contractor will be issued Task Orders that require the development of future NextGen concepts, as well as other areas of research that are affiliated with aviation.
- (d) The Contractor will support the application of scientific and analytical disciplines to conduct applied research directed toward data collection/reduction, analysis, and concept exploration and development required to satisfy existing and emerging demand for NAS services. Applied research is defined as the systematic study to gain the knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

C.2.2 Task Order Management

- (a) Task Order management is a mandatory element for all Task Orders placed under this contract. Task Order management must provide the appropriate program management and project control necessary to manage the Task Order; ensure that the cost, schedule and quality requirements for each Task Order are continually tracked and the status communicated to the FAA; and ensure that each Task Order is successfully completed.
- (b) The Contractor must furnish the necessary personnel, materials, equipment, facilities, travel, and other services required to satisfy the requirements of specific individual Task Orders.

C.2.3 Applicable Documents

Applicable FAA/DOT orders, process guidelines, and military standards will be specified and identified as references within the individual Task Orders.

C.2.4 Government Furnished Property

All Government Furnished Property (GFP), to include information, material, and equipment, will be specified within the individual Task Orders. All GFP is the property of the Government and will not be transferred to any individual or agency, public or private, without the express written approval of the Contracting Officer, except as required for the specific performance of the Task Orders.

C.2.5 Security Requirements

Security requirements, applicable to the work to be performed under each Task Order, will be identified within the individual Task Orders. Additional security clearances may be needed for specific Task Orders. Candidates identified for performance under those Task Orders must hold or be eligible to obtain the requisite security clearance.

C.2.6 Data Deliverables

Specific technical data requirements may be included in the individual Task Orders issued under this contract, either as an item in a Contract Data Requirements List (CDRL) or specified in the SOW of the Task Order.

C.2.7 Quality Management Support and Compliance

(a) Certain Task Orders may include activities that require Contractors to support the FAA in complying with various Quality systems or models. Examples of Quality systems or models include but are not limited to:

- Various International Organization for Standardization (ISO) standards such as:
 - ISO-9001, and
 - ISO-14001 (which is affiliated with Environmental Management Systems (EMS));
- Safety Risk Management / Safety Management System; and
- Capability Maturity Model Integration (CMMI).

(b) Some Task Orders may require the Contractor to assist the FAA in meeting their compliance or to support the FAA in becoming compliant.

(c) Other Task Orders may require the Contractor to be compliant. If there is requirement included in a Task Order that a Contractor be compliant, it will be up to the Prime Contractor, utilizing subcontractors as appropriate; to assure that the Quality Management support or compliance requirements are met.

C.2.8 Protection of Human Participants

The Contractor must ensure the safety and well-being of all human subjects taking part in FAA-sponsored or FAA-conducted scientific research under any task order for which the Contractor is providing support, and must adhere strictly to the provisions of the Federal Policy for the Protection of Human Subjects (49 CFR Part 11).

C.2.9 Core Capabilities

(a) The following, in alphabetical order, are descriptions of the Core Capabilities. Some of the Core Capabilities are techniques that the Contractor will be required to use when performing tasks within the functional task areas, while others are capabilities that the Contractor must provide in order to perform the SOW requirements.

(b) It is recognized that some of the Core Capabilities may fall in post Concept and Requirements Definition Readiness Decision in the AMS lifecycle. These capabilities are required to be performed earlier in the lifecycle as early iterations in order to evaluate specific concepts. Therefore some of the Core Capabilities will appear in other parts of the SE-2020 portfolio.

1. **Air Traffic Management (ATM) Automation:** Technical knowledge and experience in NAS ATM automation systems (e.g. Automated Radar Terminal System (ARTS), Standard Terminal Automation Replacement System (STARS), Common ARTS (CARTS), Host Computer System (HOST), En Route Automation Modernization (ERAM), Traffic Flow Management System (TFMS), and Advanced Technologies and Oceanic Procedures (A-TOP)(Ocean 21)) to include awareness of international system development trends and latest developments.
2. **Air Traffic Rules and Procedures:** Technical and operational knowledge and experience in current procedures and policies, and technical and operational experience in developing proposed rules and procedures related to Air Traffic operations in the NAS.
3. **Airplane Manufacturing (Large – 14 Code of Federal Regulations (CFR) Part 25):** Technical knowledge and experience in the research, design, engineering, and manufacturing of transport category airplanes above a Maximum Take off Weight of 12,500 lbs.
4. **Airplane Manufacturing (Small - 14 Code of Federal Regulations (CFR) Part 23):** Technical knowledge and experience in the research, design, engineering, and manufacturing of airplanes in utility and acrobatic categories up to a Maximum Takeoff Weight of 12,500 lbs, and commuter airplanes up to a Maximum Takeoff Weight of 19,000 lbs.
5. **Airspace Design and Analysis:** Technical knowledge and experience in airspace analysis, design/redesign, test, procedure development and configuration recommendations.
6. **Avionics Systems:** Technical knowledge and experience in the research, design, engineering, testing, and manufacturing of avionics systems, their functions, capabilities and interface requirements, and associated standards compliance requirements.
7. **Communications:** Technical knowledge and experience in ground-, air-, and satellite-based communication systems, standards, policies, and procedures.
8. **Cost Benefit Analysis:** Prepare rough order of magnitude cost-benefit analysis. Conduct life cycle cost and benefit analyses for individual and grouping of concepts commensurate with the scope and level of maturity of the concept. Technical knowledge and experience in providing Investment Analysis cost and benefit studies for large scale government type programs.
9. **Fast-Time Modeling and Simulation:** Technical knowledge and experience in the design, development, testing and execution of fast-time modeling and simulation using appropriate/validated tools. Focused on the development of foundational methods and tools for addressing problems characterized as system-of-systems. Establishment of an effective frame of reference, crafting of a common lexicon, and

- study of various modeling and simulation techniques, including probabilistic robust design (including uncertainty modeling/management), agent-based modeling, network theory, object oriented simulations, and tools for capturing the interaction of requirements, concepts, and technologies.
- 10. Human Factors:** Technical knowledge and experience to identify the physical, cognitive, and social behavior characteristics of human interactions within the aviation system environments.
 - 11. Human-in-the-Loop Simulations:** Technical knowledge and experience to simulate and evaluate human interactions within aviation environments in dynamic situations.
 - 12. Integrated Laboratories:** Technical knowledge and experience in the design, development, operation, and maintenance of integrated aviation laboratories and test beds.
 - 13. Large Scale Demonstrations:** Technical knowledge and experience in planning and conducting complex, large scale aviation demonstrations (which includes Pre-operational Trials) in a controlled laboratory setting, site specific demonstration test bed, or operational field environment.
 - 14. NAS Air Traffic Facilities:** Technical knowledge and experience in the operations, maintenance, and certification of various types, kinds, and functions of NAS Air Traffic facilities.
 - 15. Navigation:** Technical knowledge and experience in ground-, air-, and satellite-based navigation systems, standards, policies, and procedures.
 - 16. Operational Concept Development and Validation:** Technical knowledge and experience of the activities performed to support concept development and validation. Concept development is characterized as the process that describes, evaluates, and prepares a proposed capability, technology or procedure. Validation activities help quantify and qualify the operational feasibility and expected benefits of the concept.
 - 17. Rotorcraft Manufacturing (Large – 14 CFR Part 29):** Technical knowledge and experience in the research, design, engineering, and manufacturing of rotorcraft with a Maximum Takeoff Weight greater than 7,000 lbs. and less than 20,000 lbs.
 - 18. Rotorcraft Manufacturing (Small – 14 CFR Part 27):** Technical knowledge and experience in the research, design, engineering, and manufacturing of rotorcraft up to a Maximum Take off Weight of 7,000 lbs. and a maximum of nine passengers
 - 19. Security:** Technical knowledge and experience in researching, designing, and developing policies, procedures, standards, and systems to ensure the security of the NAS, including:
 1. NAS and relevant non-NAS information systems;
 2. Air Traffic Management operations and crisis response (both internal and external to the FAA);

3. Technical knowledge of National Institute of Standards and Technology (NIST) federal and special publications; particularly those providing details for FAA compliance with the Federal Information Security Management Act of 2002; and
4. Technical knowledge and experience in the seventeen (17) control families defined in NIST SP 800-53.

- 20. Service-Oriented Architecture:** Technical knowledge and experience in designing and developing procedures and systems which provide network centricity and service orientation to NAS and non-NAS systems.
- 21. Simulators, Airplane (Large – 14 CFR Part 25):** Access to, technical knowledge of, and experience using and networking simulators for Part 25 transport category airplanes into large scale disparate simulation test beds.
- 22. Simulators, Airplane (Large – 14 CFR Part 25 – Level C and D Fidelity):** Access to, technical knowledge of, and experience using and networking simulators for Part 25 transport category airplanes at different fidelity levels into large scale disparate simulation test beds.
- 23. Simulators, Rotorcraft (Large – 14 CFR Part 29 – Level C and D Fidelity):** Access to, technical knowledge of, and experience using and networking simulators for Part 29 rotorcraft at different fidelity levels into large scale disparate simulation test beds.
- 24. Standards Development:** Technical knowledge and experience in the development and implementation of both national and international technical aviation standards (e.g., FAA, RTCA and ICAO standards).
- 25. Surveillance:** Technical knowledge and experience in ground-based, air-based, and satellite-based surveillance systems, standards, policies, and procedures.
- 26. System Safety:** Technical knowledge and experience with FAA and International Safety Risk Management / Safety Management Systems (SRM/SMS).
- 27. Unmanned Aircraft Systems (UAS) Operations:** Technical knowledge and experience with the operations of all classes of UAS and the ability to analyze and recommend strategies for the integration of UAS into NAS operations.
- 28. Weather:** Technical knowledge and experience associated with detection, collection, processing, analysis, and dissemination of weather and the integration of weather data into automated decision-aiding systems to support weather avoidance.

C.3 FUNCTIONAL TASK AREAS

C.3.1 Demand for National Airspace System (NAS) Services Support

(a) The following are the high level activities performed by the FAA for the aviation community that contribute to the flow of aircraft throughout the NAS. They can be found at <http://www.nas-architecture.faa.gov/nas/home.cfm>, and are as follows:

- Air Traffic Control (ATC) – Advisory;
- ATC – Separation Assurance;
- Airspace Management;
- Emergency and Alerting;
- Infrastructure – Information Management;
- Aviation Navigation;
- Traffic Management (TM) – Strategic Flow; and
- TM – Synchronization.

(b) As tasked, the Contractor must support activities associated with identifying and quantifying (including data collection) projected demand for the aforementioned NAS services, based on diverse inputs in the form of external demand for service and capacity, long-range plans and projections, local site trends, performance and supportability trends of fielded equipment, and current/planned NAS capabilities.

C.3.2 Technology Opportunities Support

As tasked, the Contractor must support activities associated with identifying, quantifying, and keeping abreast of potential technological opportunities for supporting the NAS services. This includes being cognizant of existing Commercial-Off-The-Shelf (COTS) hardware/software systems, emerging technologies, and the potential for technology transfer of research outcomes to enable the FAA to continue to perform its mission in a safe, efficient, and cost effective manner.

C.3.3 Identified Projected Supply of Services

As tasked, the Contractor must support all activities associated with identifying and quantifying the existing and projected supply of services based on performance and supportability data, external and internal assessments of FAA-provided services, and assessments of current and planned NAS capabilities.

C.3.4 Mission Needs Analysis & Assessment Support

As tasked, the Contractor must support all activities associated with analyzing, quantifying, revalidating, and documenting requisite operational improvements by identifying and prioritizing capability shortfalls (the difference between demand and supply) of the existing NAS services.

C.3.5 Test Resources

As tasked, the Contractor must, support FAA Research and Mission Analysis activities, develop or test prototypes, provide test equipment, simulation and modeling software/tools, and test support resources.

C.3.6 Laboratory Facilities

As tasked, the Contractor must plan, design, document, and maintain laboratory facilities in support of FAA Research and Mission Analysis activities.

C.3.7 Contract Management

As tasked, the Contractor will provide management oversight support services to ensure the effective and efficient accomplishment of all tasks issued under this contract.

C.3.8 Policy Studies

As tasked, the Contractor will draft policy studies, including but not limited to analysis of policy and organizational issues inherent in the NextGen transformation, development of alternatives, analysis of trade-offs between competing goals, stakeholder analysis, conflict identification and resolution.

C.4 NEXTGEN RESEARCH FOCUS AREAS

- (a) Below are examples of some research focus areas that are anticipated to be evaluated over the life of this contract for which the Contractor may be tasked to provide support.
- (b) Some of the research focus areas will be geared towards the FAA's implementation of NextGen (i.e. The FAA NextGen Implementation Plan dated 02-10-09). In addition, this plan delineates seven solution sets that have cross-cutting implications and inter-dependencies from not only a cost and schedule perspective, but also from a technological and operational point of view that embraces all users of the NAS. These initiatives can be found at http://www.faa.gov/about/initiatives/nextgen/media/NGIP_0130.pdf. The solution sets are defined as follows:
 - Initiate Trajectory-Based Operations;
 - Increase Arrivals/Departures at High Density Airports;
 - Increase Flexibility in the Terminal Environment;
 - Improve Collaborative Air Traffic Management;
 - Reduce Weather Impact;
 - Improve Safety, Security, and Environmental Performance; and
 - Transformation of Facilities.

(c) Some of the research is anticipated to be conducted with partnering agencies as well as in collaboration with other countries (i.e. the 2004 NextGen Integrated Plan). These more global research focus areas can be found at

http://www.jpdo.gov/library/NGATS_v1_1204r.pdf, and are as follows:

- Develop Airport Infrastructure to Meet Future Demand;
- Establish an Effective Security System without Limiting Mobility or Civil Liberties;
- Establish an Agile Air Traffic System;
- Establish User-Specific Situational Awareness;
- Establish a Comprehensive Proactive Safety Management Approach;
- Develop Environmental Protection that Allows Sustained Aviation Growth;
- Develop a System-Wide Capability to Reduce Weather Impacts; and
- Harmonize Equipage and Operations Globally.