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For the Air Traffic Organization of the Federal Aviation Administration

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Identifying the Workforce to Respond to a National Imperative—The Next Generation Air Transportation System (NextGen)

NextGen Competency Models

Panel

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The views expressed in this report are those of the Panel. They do not necessarily reflect the views of the Academy as an institution.

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INTRODUCTION

In June 2007, the Federal Aviation Administration's Air Traffic Organization (ATO) engaged the National Academy of Public Administration (the Academy) to help it formally examine its workforce strengths and weaknesses with respect to the transition to the Next Generation Air Transportation System (NextGen). ATO asked the Academy to undertake two specific tasks:

- Task 1: Identify the skill sets required by the ATO non-operational workforce to design, develop, test/evaluate, integrate and implement NextGen, including, but not limited to technical and contract management skills
- Task 2: Define the strategies to obtain the expertise necessary to manage, integrate and implement the complex activities inherent in the transition to NextGen

In order to provide the ATO the most comprehensive and useful responses to the two specific tasks, the Academy Panel interpreted the requirements as broadly as possible. For Task 1, the Panel determined that its response should encompass not only "skill sets" but also the knowledge requirements and behavioral indicators that describe successful application of these skills. This approach enabled the Academy to develop complete competency models, rather than a one-dimensional listing of skills. The resulting competency models provide the ATO more complete information that can be used to shape the hiring as well as training and development criteria for the affected workforce.

The competency models were developed by researching and analyzing data from a wide variety of sources, including:

- Federal Acquisition Institute
- Defense Acquisition University
- International Council on Systems Engineering
- Competency Standard for Complex Project Managers
- ATO's Existing Occupational Family Models
- Other Agencies' Competency Models

Data from these sources were analyzed in conjunction with data gathered from other sources, including colloquia of external subject matter experts, a roundtable discussion with ATO's Vice Presidents of the service units, interviews, and focus groups of employees. To construct draft models. Then, the models were disseminated to the ATO VPs and subject matter experts for "validation."

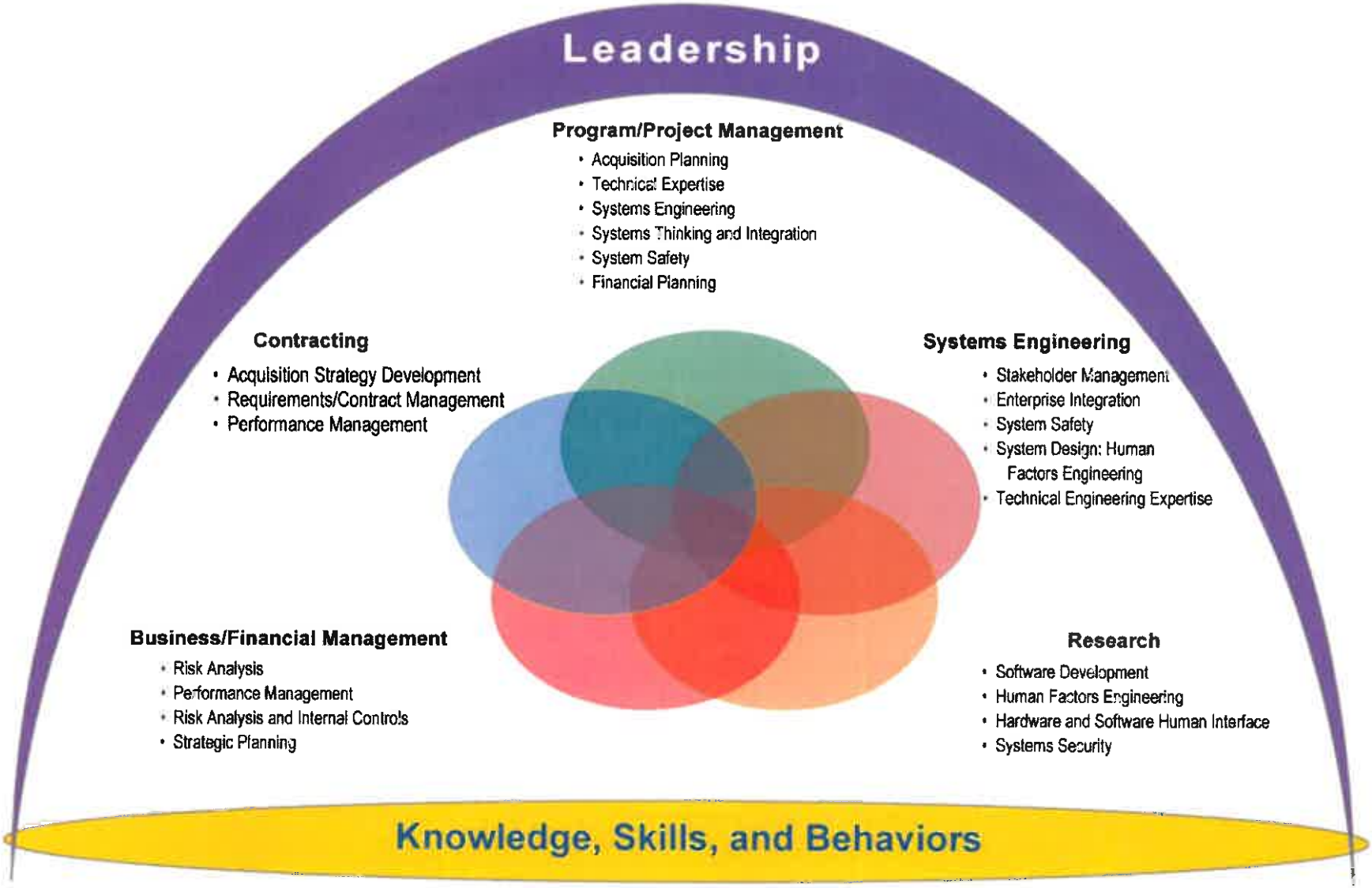
The resulting competency models are presented in this volume. An overarching NextGen Leadership Competency Model is presented, in addition to a separate model for each of the five occupational families that comprise the acquisition workforce:

- Program/Project Management
- Systems Engineering
- Research

- Business/Financial Management
- Contracting

The models reflect significant overlap in the competencies, knowledge and skills required in the five occupational families, but there are also specific competencies for each family—tailored to the FAA environment. The Academy recommends that thee models be integrated into ATO's broader workforce planning efforts and shared with the workforce to obtain their buy-in.

NEXTGEN COMPETENCY MODELS



VALIDATED COMPETENCY MODELS

Table 1
Program/Project Management Competency Model[1]

I. Competency Area: Program/Project Planning and Management *This competency area specifies the competencies required to align programs and projects with the organization's strategic goals and objectives, to conduct program/project planning, and to manage programs and projects that deliver quality, affordable, supportable and effective systems and products*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Strategic Alignment	• Knowledge of FAA and ATO mission, strategic plans, goals and objectives and their impact on NextGen • Knowledge of the vision, goals, and objectives, and business case for the NextGen transition • Knowledge of program/project management strategies that support NextGen goals • Knowledge of the National Airspace System	• Defines the purpose, goals, scope, outputs, outcomes, and constraints of the program/project and links them to FAA/ATO and NextGen goals • Defines the desired program/project objectives in measurable terms and flows them down to the implementation level • Establishes key performance indicators to reflect strategic focus and makes changes over the lifecycle • Maps the program/project goals, objectives, and performance measures within FAA's and ATO's strategic framework • Allocates and aligns resources to ensure accomplishment of goals • Keeps team members focused on program vision and goals as they deal with problems, obstacles, or changes
Organizational Awareness	• Knowledge of the ATO organizational structure and governance system, including the "chain of command," key actors, and decision makers • Knowledge of the climate and culture of the agency and how its social, political, and technological systems work	• Applies organizational knowledge to gain support for program/project goals and objectives • Identifies key decision-makers and those who influence them • Recognizes the unspoken organizational constraints and their impact on program/project accomplishment • Addresses internal and external political issues and pressures in order to achieve program/project goals

[1] Program managers may often have broader responsibilities than project managers, including managing more than one project. However, essential competencies for these two groups do not differ significantly. Leadership competencies required by program/project managers are covered by the NextGen Leadership Competency Model (Table 7 of this document).

1. Competency Area: Program/Project Planning and Management *This competency area specifies the competencies required to align programs and projects with the organization's strategic goals and objectives, to conduct program/project planning, and to manage programs and projects that deliver quality, affordable, supportable and effective systems and products.*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Program/Project Planning Processes	• Knowledge of specific methods for planning and organizing work to achieve program/project goals • Knowledge of FAA's acquisition policies and procedures	• Organizes work, sets priorities, and determines resource requirements • Determines short- or long-term goals and strategies to achieve them • Develops plans within the established agency acquisition policies and procedures • Reviews program/project plans and general documentation for relevance within the changing environment • Ensures that the resource plan, including human capital tools and systems, satisfies both current and emergent needs across the life of the program/project • Selects project delivery methodology based on level of uncertainty and stakeholder characteristics
Capital Planning and Investment Assessment	• Knowledge of business planning processes • Knowledge of the principles and methods of capital investment analysis and business case analysis, including return on investment	• Establishes a formal business planning process that supports program/project management strategy • Ensures that the program/project business case is fully developed • Regularly reviews business case in the light of changing circumstances and the current strategic environment
Program/Project Management Processes	• Knowledge of the principles, methods, and tools for developing, scheduling, coordinating, and managing programs/projects and resources • Specific knowledge of portfolio, program and project management systems and tools • Knowledge of the tools and processes used to assess the progress of programs and projects	• Gains initial agreement on the program/project goals with key stakeholders and the team • Determines the appropriate program/project management lifecycle to achieve deliverables • Provides direction on the program/project plan and ensures the most effective means of delivering the objectives throughout the life of the effort • Develops key performance indicators (metrics) that are aligned with strategic and program/project objectives

I. Competency Area: Program/Project Planning and Management *This competency area specifies the competencies required to align programs and projects with the organization's strategic goals and objectives, to conduct program/project planning, and to manage programs and projects that deliver quality, affordable, supportable and effective systems and products.*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
	• Knowledge of program/project performance review and analysis methodology and tools • Skill in identifying and documenting program/project performance indicators • Skill in identifying and documenting program/project performance indicators	• Conducts ongoing tracking, analysis, and review of key performance indicators and changes them as appropriate • Regularly reviews program/project management plan in light of changing circumstances and the current strategic environment • Uses an integrated multidisciplinary approach to deliver program/project outcomes and avoid stovepipes • Manages progress of the program/project against scope, quality, safety, time and cost baselines including approved changes • Coordinates with other parts of the organization to accomplish goals • Manages the transition to the operational/support stage of the program or project's lifecycle
Stakeholder Management	• Knowledge of stakeholder considerations and their impact on planning	• Identifies internal and external stakeholders • Uses ongoing stakeholder mapping and management of relationships with stakeholders including defining stakeholder requirements and managing expectations, and ensures that accountability requirements are addressed at all stages of the program/project • Integrates stakeholder considerations into program/project plans
Requirements Analysis	• Knowledge of the principles and methods used to identify, analyze, design, and manage functional requirements, including translating functional requirements into technical requirements	• Defines user needs and integrates them into the requirements analysis process • Develops and refines business, functional, and technical requirements

1. Competency Area: Program/Project Planning and Management *This competency area specifies the competencies required to align programs and projects with the organization's strategic goals and objectives, to conduct program/project planning, and to manage programs and projects that deliver quality, affordable, supportable and effective systems and products*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Risk Management	• Knowledge of methods and tools used for risk assessment and mitigation	• Identifies and assesses risk throughout the program/project lifecycle • Determines which risks require management • Selects and implements the plans or actions that are required to ensure that risks are controlled
Technical Expertise	• Knowledge of the technical disciplines and functions of the program	• Applies knowledge of technical engineering disciplines in managing programs and projects • Assesses and evaluates technical issues impacting the progress of the program or project and makes sound, technically based decisions

11. Competency Area: Program/Project Systems Engineering[2] *This competency area encompasses the competencies needed to integrate all the disciplines and specialty groups into a team effort forming a structured development process that proceeds from concept to production to operation*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Systems Thinking and Integration	• Knowledge of the fundamental concepts of systems thinking, including an understanding of how actions and decisions in one area affect another • Knowledge of the role a system plays in the "system of systems" of which it is a part • Knowledge of the enterprise and technological environment in which systems engineering is conducted • Detailed knowledge of systems integration concepts and approaches used in the agency	• Uses systems thinking concepts to identify individual and organizational assumptions that influence situations impacting the program/project • Defines systems boundaries and external interfaces • Plans for nonlinear and recursive actions • Uses systems thinking principles, concepts, and tools to design alternative ways of addressing specific issues impacting the program/project • Identifies the "system of systems" capability issues which will affect the design of a system and translates these into system requirements • Assesses the extent to which the proposed system solution meets the system of systems capability and provides advice and trade offs • Identifies the enterprise and technology issues that will affect the design of a system and translates these into system requirements • Produces and implements a technology plan that includes technology risk, maturity, readiness levels and insertion points
System Safety	• Knowledge, capabilities and practices associated with the use of formal approaches to analyze hazards that impact human, environment and mission assets in order to	• Develops safety risk models using qualitative techniques such as System Hazard Analysis (SHA) and quantitative techniques such as Probabilistic Risk Assessment (PRA)

[2] *Systems Engineering* constitutes a separate occupational family within the acquisition workforce, and as such is addressed as a separate competency model in this document. This model identifies the core competencies of systems engineering that are most critical for program/project managers. These systems engineering competencies are based on the core competencies identified by the International Council on Systems Engineering: *Systems Engineering Core Competencies Framework*, May 2005.

II. Competency Area: Program/Project Systems Engineering[2] *This competency area encompasses the competencies needed to integrate all the disciplines and specialty groups into a team effort forming a structured development process that proceeds from concept to production to operation*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
	provide decision makers with recommendations on ways to eliminate the hazards or reduce their risk to acceptable levels	• Proactively and reactively identifies the need for risk trade studies concerning resolution of hazards • Formulates risk reduction strategies • Communicates safety risk insights to decision-makers in a timely and effective manner

III. Competency Area: Test and Evaluation (T&E) *This competency area involves planning, monitoring, conducting, and evaluating tests of prototype, new or modified systems equipment or materiel*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
T&E Management	• Knowledge of the efficient and cost effective methods for planning, monitoring, conducting, and evaluating tests of prototype, new, or modified systems or materiel • Skill in developing a thorough T&E strategy to validate system performance • Skill in identifying testing needs and establishing and coordinating test conduct activities	• Plans, develops, or directs the development of T&E strategies and plans • Oversees the execution of T&E strategies and plans to support program/project goals

IV. Competency Area: Life Cycle Logistics (LCL)

This competency area involves planning, development, implementation, and management of a comprehensive, affordable, and effective systems support strategy to ensure the integration of all support elements to maximize deployability, supportability, and mobility of the system throughout the program/project life cycle.

Competency	Knowledge/Skill Required	Behavioral Indicators
• **LCL Strategy Development** • **Development of Supportability Requirements** • **Performance-Based Logistics**	• Knowledge of performance-based logistics efforts that optimize total system lifecycle availability, supportability and reliability/maintainability while minimizing cost and logistic footprint and interoperability	• Ensures system support strategies meet the program goals for operational effectiveness, optimize readiness, and facilitate iterative technology enhancements during the systems life cycle • Ensures supportability requirements are addressed consistently with cost, schedule, and performance • Performs an integral role in systems engineering to ensure supportability considerations are implemented during systems design • Plans and develops performance based logistics initiatives as the preferred approach to product support

V. Competency Area: Contracting

This competency area includes supervision, leadership, and management of the processes and procedures that are involved in the acquisition of supplies and services, construction, and research and development through formal contracts.

Competency	Knowledge/Skill Required	Behavioral Indicators
Acquisition Planning	• Knowledge of contracting strategies and approaches • Skill in developing and implementing acquisition strategies needed to assure that supplies and services are available when needed to meet mission requirements	• Analyzes and assesses acquisition needs to support program/project goals and objectives • Develops and documents the overall contingency based acquisition strategy for managing the acquisition, including testing potential contractors for appropriate maturity, competency, and culture • Selects contract instruments to fit program/project complexity, stakeholder maturity, and contextual issues
Market Analysis	• Knowledge of government and non-government sources	• Skill in collecting and analyzing relevant market information from government and non-

V. Competency Area: Contracting *This competency area includes supervision, leadership, and management of the processes and procedures that are involved in the acquisition of supplies and services, construction, and research and development through formal contracts.*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
	• Knowledge of the business implications relevant to documenting requirements	government sources • Analyzes and provides business advice in the preparation of requirements documents and related elements of the acquisition
Source Identification and Selection	• Knowledge of the potential sources for specific acquisitions	• Identifies possible sources for the acquisition through effective market analysis and knowledge of suppliers • Participates in source selection
Contract Administration	• Knowledge of contract administration methods and techniques	• Develops a plan for contract administration • Ensures adherence to terms of the contract and applicable laws and regulations
Contractor Performance Management	• Knowledge of contractor performance requirements and appropriate remedies	• Manages contractor performance and coordinates with Contracting Officer on necessary action related to delays in contractor performance or the need to stop work under the contract • Recommends remedies to protect the rights of the government under commercial item contracts and simplified acquisitions • Recommends remedies to protect the government under noncommercial item contracts • Documents past performance information for the Contracting Officer

VI. Competency Area: Business, Cost Estimating, and Financial Management *This competency area involves conducting all aspects of planning and estimating the financial requirements of acquisitions needed to support program/project objectives*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Cost Estimating	• Knowledge of the types and methods of cost estimating	• Uses cost estimation models to estimate the cost of a product or project that is factored into the business plan, budget or other financial planning and tracking mechanisms
Financial Planning	• Knowledge of financial planning methods, tools, and processes	• Creates a financial plan using financial statement (balance sheets, income statements, and cash flow statements to estimate future income, expenses, and assets)
Formulation of Financial Programs and Budget	• Knowledge of established budgeting systems and tools • Knowledge of financial and budget terms and key financial guidance	• Defines key financial and budget terms and identifies the key financial management legislation affecting the formulation of the budget • Formulates the program/project budget • Integrates the program/project's financial program and performance budgeting
Benefit-Cost Analysis	• Knowledge of cost-benefit analysis methods, concepts, and processes	• Weighs the program/project's expected costs against the total expected benefits of one or more actions in order to choose the best option
Budget Execution	• Knowledge of systems and processes for tracking actions affecting the budget	• Executes the program/project budget in accordance with all governmentwide and agency policies, processes, and procedures

VI. Competency Area: Business, Cost Estimating, and Financial Management *This competency area involves conducting all aspects of planning and estimating the financial requirements of acquisitions needed to support program/project objectives*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Earned Value Management (EVM)	• Knowledge of and skill in applying EVM techniques	• Uses EVM techniques to measure forward progress in an objective manner, including a plan that identifies work to be accomplished, a valuation of planned work, and pre-defined earning rules to quantify the accomplishment of work

VII. Competency Area: Information Technology (IT) Project Management—This competency area defines the competencies, knowledge, and skills that are specific to IT projects. In addition to the competencies required of all project managers, IT project managers also require specific competencies described below.[3]		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Information Technology Architecture	• Knowledge of the architectural methodologies used in the design and development of information systems	• Ensures that IT systems are fully integrated into the FAA and ATO IT architecture
Configuration Management	• Knowledge of the principles and methods for planning or managing the implementation, update, or integration of information systems components	• Identifies standards or requirements for infrastructure configuration or change management • Tracks all of the individual Configuration Items (CI) in an IT system • Evaluates the feasibility of implementing new technology within current environment
Systems Integration	• Knowledge of the principles, methods, and procedures for installing, integrating, and optimizing information systems components	• Integrates hardware and software components within the systems environment • Monitors and fine-tunes performance of the

[3] *Interpretive Guidance for Project Manager Positions*, U.S. Office of Personnel Management, August 2003.

VII. Competency Area: Information Technology (IT) Project Management--This competency area defines the competencies, knowledge, and skills that are specific to IT projects. In addition to the competencies required of all project managers, IT project managers also require specific competencies described below.[3]		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
		systems environment
Information Systems/Network Security	• Knowledge of methods, tools, and procedures, including development of information security plans, to prevent information systems vulnerabilities, and provide or restore security of information systems and network services	• Leads the implementation of security programs designed to anticipate, assess, and minimize system vulnerabilities • Conducts risk and vulnerability assessments of planned and installed information systems to identify vulnerabilities, risks and protection needs • Develops and implements programs to ensure that systems, network, and data users are aware of, understand, and adhere to systems security policies • Ensures the rigorous application of information security/information assurance policies, principles, and practices in the development of IT systems
Information Technology Performance Assessment	• Knowledge of the principles, methods, and tools (e.g., surveys and systems performance measures) to assess the effectiveness and practicality of information technology systems	• Establishes metrics to measure and evaluate systems performance and total cost of ownership • Conducts audits of IT projects
Infrastructure Design	• Knowledge of the architecture and typology of software, hardware, and networks, including LANS, WANS, and telecommunications systems, their components and associated protocols and standards and how they operate and integrate with one another and with associated	• Integrates hardware and software components within the systems environment • Evaluates new systems engineering technologies and their effect on the operating environment • Ensuring that information security/information assurance policies, principles, and practices are an integral element of the operating environment

VII. Competency Area: Information Technology (IT) Project Management—This competency area defines the competencies, knowledge, and skills that are specific to IT projects. In addition to the competencies required of all project managers, IT project managers also require specific competencies described below.[3]		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
	controlling software	
Systems Life Cycle	• Knowledge of systems life cycle management concepts	• Plans, designs, and implements new and improved information systems to meet the business requirements • Plans and coordinates change activities with application developers, vendors, and customers • Manages implementation and deployment • Develops solutions to complex operational problems
Data Management	• Knowledge of the principles, procedures, and tools of data management, such as modeling techniques, data backup, data recovery, data dictionaries, data warehousing, data mining, data disposal, and data standardization processes	• Designs, develops and maintains data management systems that meet current and future business requirements • Designs, develops, and maintains databases • Monitors and optimizes database performance and database operations • Designs data mining and data warehousing systems

Table 2
Systems Engineering Competency Model

I. Systems Thinking *The under pinning systems concepts and the system/system of system skills including the business and technological environment*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Systems Concepts	• Knowledge of systems concepts, including system lifecycle, hierarchy of systems, system context, interface definition and management	• Identifies and manages complexity with appropriate techniques in order to reduce risk • Predicts resultant system behavior • Defines system boundaries and external interfaces • Assesses the interaction between humans and systems • Anticipates the impact of specific changes on complex technical systems
"System of System" Capability Issues	• Knowledge of the concept of capability • Knowledge of the impact of "system of system" capability on system development • Knowledge of the difficulties of translating "system of system" capability needs into system requirements	• Identifies the "system of system" capability issues which will affect the design of a system and translates these into system requirements • Assesses extent to which the proposed system solution meets the "system of system" capability, and provide advice on trade offs
Enterprise & Technology Environment	• Knowledge of the influence the enterprise (environment, objectives, social, political, financial, cultural) has on the definition and development of the system • Knowledge of the influence technology has on the definition and development of the system • Knowledge of the influence the system has on the enterprise and on technology	• Identifies the enterprise and technology issues which will affect the design of a system and translates these into system requirements • Produces and implements a technology plan that includes technology risk, maturity, readiness levels and insertion points • Recognizes complex interrelationships among National Airspace (NAS) Systems • Develops operational concepts that successfully integrate into the NAS and identifies integration risks

II. Holistic Lifecycle View *The skills associated with the systems lifecycle from need identification and, requirements determination through to operation and ultimately disposal.*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Stakeholder Management	• Knowledge of the need for good quality requirements • Skill to be able to identify major stakeholders • Knowledge of the importance of managing requirements throughout the lifecycle • Knowledge of the need to manage both technical and non-technical requirements	• Successfully elicits stakeholder requirements • Develops good quality requirements • Produces a system requirements specification • Writes the requirements management plan including categorizations and structures • Defines a process to manage the requirements and ensure its effective implementation • Effectively assesses the impact of change • Works with smart buyers from industry to manage contracts • Resolves and negotiates requirement conflicts in order to establish a complete and consistent requirement set • Establishes acceptance criteria for complex requirements • Identifies areas of uncertainty and risk when determining requirements • Challenges appropriateness of requirements in a rational way • Validates the requirements
System Design: Architectural Design	• Knowledge of the principles of architectural design and its role within the lifecycle • Knowledge of the different types of architecture	• Generates alternative architectural designs from the requirements in a verifiable way • Assesses a range of architectural solutions and justifies the selection of the optimum solution • Defines a process and appropriate tools and techniques for architectural design • Chooses appropriate analysis and selection techniques • Partitions between discipline technologies and derives discipline specific requirements

II. Holistic Lifecycle View *The skills associated with the systems lifecycle from need identification and, requirements determination through to operation and ultimately disposal*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
System Design: Concept Generation	• Understanding of the need to explore alternative solutions • Knowledge of alternative discipline technologies that can be used to satisfy the same requirement	• Identifies the strengths and weaknesses of relevant discipline technologies • Creates a range of alternative interdisciplinary concepts • Assesses the alternative solutions for risk, cost, schedule, technology requirements, factors • Selects a number of possible solutions and demonstrate that credible, solutions exist
System Design: Design for ...	• Understanding of the need to design for the requirements of later lifecycle stages	• Identifies and plans for the incorporation of later lifecycle design attributes at the correct point within the design process • Works with appropriate specialists to ensure that these design attributes are addressed
System Design: Functional Analysis	• Knowledge of Functional Models • Knowledge of the relevance of the outputs from Functional Analysis and how these relate to the overall system design	• Defines the strategy and approach to be adopted for the functional analysis of the system • Performs functional analysis • Defines a process and appropriate tools and techniques for functional analysis
System Design: Interface Management	• Knowledge of interface management and its impact on the integrity of the system solution • Knowledge of the possible sources of complexity in interface management, e.g., multinational programs, multiple suppliers, different domains, and novel technology	• Defines a process and appropriate techniques to be adopted for the interface management of system elements • Identifies, defines and controls system element interfaces • Describes the sources of complexity for the interface management of the system, e.g. multinational programs, multiple suppliers, different domains, novel technology, etc • Arbitrates where there are conflicts in the definition of interfaces
System Design: Maintaining Design Integrity	• Knowledge of the need to maintain the integrity of the design	• Identifies parameters to track critical aspects of the design

II. Holistic Lifecycle View *The skills associated with the systems lifecycle from need identification and requirements determination through to operation and ultimately disposal*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
		• Relates the current design to the original intent throughout the supply chain • Takes remedial actions in the presence of inconsistencies • Establishes a system which allows the tracking of specific aspects of the design • Manages and trades technical margins both horizontally and vertically through the hierarchy
System Design: Modeling and Simulation	• Understanding of the need for system representations • Knowledge of scope and limitations of models and simulations	• Defines an appropriate representation of a system or system element • Uses appropriate representations of a system or system element in order to derive knowledge about the real system • Implements the strategy and approach to be adopted for the modeling and simulation of a system or system element
System Design: Solution Selection	• Knowledge of the importance of selecting a preferred solution • Knowledge of comparative techniques (e.g., trade studies, make/buy, etc.) to assist decision processes	• Defines, weights and assesses potential solutions against selection criteria such as technology requirements, off-the-shelf availability, competitive considerations, performance assessment, maintainability, capacity to evolve, standardization considerations, integration concerns, cost, schedule, etc. • Chooses the appropriate tools and techniques for selecting the preferred solution, e.g. trade analysis, make/buy analysis • Performs trade analysis and justifies the result chosen in terms that can be quantified and qualified • Negotiates trades
System Design: System Robustness	• Knowledge of the importance of the design and how it affects the robustness of the solution throughout the lifecycle	• Defines the strategy and approach to be adopted for ensuring system robustness • Selects the appropriate techniques for ensuring system

II. Holistic Lifecycle View *The skills associated with the systems lifecycle from need identification and requirements determination through to operation and ultimately disposal*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
	• Knowledge of analytical techniques and the importance of design integrity, whole life costs, and customer satisfaction	robustness • Understands the operational environment and underlying domain specific issues related to robustness • Performs robustness trade offs • Uses scenarios to determine robustness • Specifies procurement of system elements in terms of reliability, availability, maintainability and safety
System Design: Human Factors Engineering	• Knowledge and capabilities to apply human factors engineering principles, standards, design guides, regulations, and advisory material to the design, test, evaluation, operation, and maintenance of systems and processes	• Defines and analyzes human engineering requirements; formulates human performance criteria; develops guidelines; and develops system concepts, designs, and prototypes • Evaluates human-centered technologies and develops training curricula for application to processes and systems
Integration and Verification	• Knowledge of the importance of verification against the system requirements • Knowledge of the importance of integrating the system in a logical sequence • Knowledge of the need to plan for systems integration and verification • Knowledge of the relationship between verification and acceptance • Knowledge of the National Airspace System	• Identifies the integration and verification environment • Traces verification requirements back to system requirements and vice versa • Writes an Integration and Verification Plan for a complex system, including identification of method and timing for each activity • Demonstrates effective management of systems integration and verification activities • Writes detailed test procedures • Diagnoses complex faults; documents, communicates and follows up corrective actions • Plans and prepares evidence for customer acceptance and certification •
Validation	• Knowledge of the purpose of validation and	• Focuses on customer needs and communicates in the

II. Holistic Lifecycle View *The skills associated with the systems lifecycle from need identification and, requirements determination through to operation and ultimately disposal*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
	the need for early planning for validation	language of the customer/user • Traces validation requirements back to user needs and vice versa • Writes validation plans for a complex system, including identification of method and timing for each activity • Writes detailed validation procedures • Demonstrates effective management of systems validation activities • Assesses validation results • Plans and prepares evidence for customer acceptance
Transition to Operation	• Knowledge of the need to transition a system into operation • Knowledge of the type of activities required for transition to operation	• Focuses on operations and communicates in the language of the user • Understands the system's contribution to the "System of Systems" • Plans and oversees a transition to operation activity

III. Technical Engineering *The discipline and profession of applying scientific knowledge and utilizing natural laws and physical resources in order to design and implement materials, structures, machines, devices, systems, and processes that realize a desired objective and meet specified criteria*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Civil	• General knowledge of the physical sciences and mathematics underlying engineering, and specialized knowledge of (a) mechanics of solids, particularly of soils, (b) hydraulics, (c) theory of structure, (d) strength of materials, (e) engineering geology, and (f) surveying.	• Oversees the planning, designing, constructing, and/or maintaining structures and facilities that provide shelter, support transportation systems, and control natural resources • Investigates, measures, surveys and maps the earth's physical features and phenomena • Conducts research and development in these areas
Electrical	• Knowledge of the physical and engineering	• Able to work with and design electrical circuits, circuit

III. Technical Engineering *The discipline and profession of applying scientific knowledge and utilizing natural laws and physical resources in order to design and implement materials, structures, machines, devices, systems, and processes that realize a desired objective and meet specified criteria*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
	sciences and mathematics • Knowledge of electrical phenomena • Knowledge of the principles, techniques, and practices of electrical engineering.	elements, equipment, systems, and associated phenomena concerned with electrical energy for purposes such as motive power, heating, illumination, chemical processes, or the production of localized electric or magnetic fields.
Electronics	• Knowledge of the physical engineering sciences and mathematics • Knowledge of electronic phenomena • Knowledge of the principles, techniques, and practices of electronics engineering	• Able to work with and design electronic circuits, circuit elements, equipment, systems, and associated phenomena concerned with electromagnetic or acoustical wave energy or electrical information for purposes such as communication, computation, sensing, control, measurement, and navigation
Computer	• Knowledge of fundamentals and principles of professional engineering • Knowledge of computer hardware, systems software, and computer system architecture and integration • Knowledge of mathematics, including calculus, probability, statistics, discrete structures, and modern algebra.	• Applies scientific discipline and professional engineering principles to complex computer based systems that require research, design, development, and maintenance of computer equipment and interfaces (hardware) and applications and support (software) • Develops unique systems such as embedded computers in systems for complex scientific applications, simulation systems, communication systems, computer-aided engineering and design systems, and large-scale management information systems

IV. Systems Engineering Management *Deals with the skills of choosing the appropriate lifecycle and the planning, monitoring and control of the systems engineering process*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Concurrent Engineering	• Knowledge that lifecycle activities and the development of systems elements can occur concurrently • Knowledge of the advantages and disadvantages of concurrency	• Identifies which system elements can be developed concurrently • Manages the interactions within a systems engineering lifecycle • Coordinates concurrent activities and deals with emerging issues • Writes the Systems Engineering Management Plan • Advises the project manager on concurrency issues and risks
Enterprise Integration	• Understanding of an enterprise as a system • Knowledge of other functions of the enterprise that have inputs to and outputs from the systems engineering process	• Manages the relationship between the systems engineering function and other elements of the enterprise • Identifies systems engineering products required by other functions and vice versa • Uses systems engineering techniques to contribute to the definition of the enterprise • Identifies the constraints placed on the systems engineering process by the enterprise
Integration of Fields of Specialization	• Knowledge of the different fields of specialization • Knowledge of the importance of integrating fields of specialization into the project • Knowledge that the fields of specialization can affect the cost of ownership	• Manages the integration of fields of specialization within a project • Conducts trade-offs involving conflicting demands from the fields of specialization • Understands how the fields of specialization affect the cost of ownership • Identifies the constraints placed on the system development by the needs of the fields of specialization
Lifecycle Process Definition	• Knowledge of systems lifecycles • Knowledge of appropriate lifecycle processes	• Identifies the program, enterprise and technology needs that affect the definition of the lifecycle • Influences the lifecycle of related system of system elements

IV. Systems Engineering Management *Deals with the skills of choosing the appropriate lifecycle and the planning, monitoring and control of the systems engineering process*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
		• Identifies dependencies and align the lifecycles of different system elements
Planning, Monitoring and Controlling	• Knowledge of the importance of planning, monitoring and controlling systems engineering activities	• Plans systems engineering activities as part of an overall project plan • Identifies, assesses, analyzes and control systems engineering risks • Influences project management in order to secure the systems engineering needs of the project • Controls systems engineering activities by applying necessary corrective actions • Tailors systems engineering processes to meet the needs of a specific project

V. Safety Engineering and Assurance *Involves the knowledge of scientific, engineering and management principles for ensuring safety of missions and systems through controlled design, development, and operation*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Precursor Analysis	• Knowledge of the capabilities and practices associated with the identification of forerunners to failure • Knowledge of risk analysis techniques and risk models to be able to infer the risk implications of conditions, events or sequences of events that are precursors to accidents • Knowledge of quantification techniques to assess the probability implications of a precursor event or a precursor sequence events	• Develops safety performance measures and applies criteria and techniques such as safety audits, assessments, inspections, trend analysis, precursor analysis, and sampling to monitor safety performance and to identify and eliminate/mitigate hazards and achieve an acceptable level of risk, within the constraints of operational effectiveness and suitability, time, and cost throughout all phases of the system • Screens data and records to identify potential candidate precursors and assesses the risk implications of the screened events to estimate the severity of the event in terms of the nearness of the event to a failure or accident • Conducts assessments of preventative or mitigative

V. Safety Engineering and Assurance *Involves the knowledge of scientific, engineering and management principles for ensuring safety of missions and systems through controlled design, development, and operation*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
		actions to determine their impact on the precursor probability or consequences
Probabilistic Risk Assessment	• Knowledge of the assessment of system success criteria, accident scenario development using logic techniques, phenomenological failure modeling, quantification of accident scenarios using probabilistic and statistical analysis techniques, consequence assessment uncertainty and risk-trade-off analysis, and risk communication	• Develops system risk models to support risk-informed decision making
System Safety	• Knowledge, capabilities and practices associated with the use of formal approaches to analyze hazards that impact human, environment and mission assets in order to provide decision makers with recommendations on ways to eliminate the hazards or reduce their risk to acceptable levels	• Develops safety risk models using qualitative techniques such as System Hazard Analysis and quantitative techniques such as Probabilistic Risk Assessment • Proactively and reactively identifies the need for risk trade studies concerning resolution of hazards • Formulates risk reduction strategies • Communicates safety risk insights to decision-makers in a timely and effective manner
Trend Analysis	• Knowledge of the practices associated with the identification of trends and patterns in data • Knowledge and demonstrated capability in using software packages for trend analysis	• Conducts statistical analysis including both classical and Bayesian statistics • Conducts data mining techniques and statistical learning approaches • Identifies statistically significant time trends, patterns associations, outliers, and periodicities • Interprets the information provided by trends and patterns in terms of their program implications

Table 3
Research Competency Model

I. Computer Science *The study and the science of the theoretical foundations of information and computation and their implementation and application in computer systems*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Software Development	• Expertise, knowledge and skills in information/software systems architectures and reuse architectures • Knowledge of component-oriented software production, large-scale application systems development, information/software project management, and risk management • Knowledge of software process models, software engineering technologies and tools, code component reuse, web technology, and state-of-the-art commercial development tools	• Applies systematic disciplines and quantifiable approaches to the acquisition and development of software systems for spaceflight, ground support, airborne and facility applications • Analyzes algorithms and the trade-offs needed • Predicts, evaluates and manages critical performance attributes of software-intense systems such as real-time response and embedded hardware-driven resource limits
Prototype Modeling	• Knowledge of the prototype modeling process and techniques in identifying the basic requirements • Knowledge of the development of the initial prototype, reviewing the prototype, and revising and enhancing the prototype	• Sets up and manages simulations of the software and hardware to refine system requirements
Systems Security	• Expert knowledge of information systems security	• Oversees the implementation and enforcement of rigorous security procedures that protect the integrity of the systems, networks, and data

I. Computer Science *The study and the science of the theoretical foundations of information and computation and their implementation and application in computer systems*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Networks	• Knowledge of techniques to research and implement high-speed wide area networks, including technology development to allow very advanced networks to allow data, audio and video communication • Knowledge of electrical, optical and wireless transmission, telemetry and modeling, simulation of communication systems, and emulation of flight systems, sensors and data acquisition systems to function in an optimal fashion for distributed science and engineering applications • Technical skills used in the development and application of computer networks and Internet technology, including switching/routing technology, network architecture, and network security	• Ability to analyze and evaluate systems and network requirements and to devise and obtain support for innovative solutions that meet requirements and enable efficient use of resources available

II. Human Factors Analysis *Examines at all aspects of the human role. The performance and safety demanded by complex, technical environments depend on the performance of human participants and their relationship to the systems.*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Human Factors Engineering	• Knowledge and capabilities to apply human factors engineering principles, standards, design guides, regulations, and advisory material to the design, test, evaluation, operation, and maintenance of systems and processes	• Defines and analyzes human engineering requirements • Formulates human performance criteria; develops, guidelines; develops system concepts, designs, and prototypes • Evaluates human-centered technologies and develops training curricula for application to processes and systems
Human Factors Physical and Psychological Process	• Knowledge of the physical and psychological processes, capabilities, skill levels, and limitations of humans, such as the science and practical application of experimental psychology, cognitive psychology, human reliability, anthropometrics, biomechanics, and psychophysiology	• Applies theories, experimentation, analysis and modeling to increase fundamental knowledge about human cognition and performance
Hardware and Software Human Interface Design	• Knowledge of hardware and software human-interface design principles, modalities (e.g., physical, visual, auditory, verbal), methods (e.g., field studies, analysis, modeling, prototyping, laboratory experiments, simulations, mockups, database reviews) and tools	• Develops human factors principles and guidelines which could be used toward designing technology for human performance in environments to reduce errors and increase productivity

III. Operations Research *An interdisciplinary branch of applied mathematics and formal science that includes methods such as mathematical modeling, statistics, and algorithms to arrive at optimal or near optimal solutions to complex problems.*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Statistical Analysis	• Knowledge of rigorous methods of scientific inquiry and analysis used to develop and adapt statistical and other scientific methods and techniques	• Conducts systematic examinations of alternative courses of action in terms of effectiveness by using statistical and scientific methods and techniques to analyze problems • Develops and structures the problem and establish procedures for obtaining data and determines variables that are relevant to the problem • Draws conclusions from studies and formulates recommendations concerning program approaches to management for decision-making purposes
Network Analysis	• Knowledge of networking principles	• Oversees the configuration, installation, deployment, management, and maintenance of network and communications hardware and software systems network flow optimization
Risk Management	• Knowledge, capabilities and practices relevant to the decision process associated with mitigating and accepting risks • Knowledge of fundamental risk management concepts, Continuous Risk Management implementation in programs/projects, Risk-Based Acquisition Management implementation for major procurements that require formal acquisition planning and ongoing assessment of program/project risk management activities	• Explains the risks and how to mitigate them to build credibility among stakeholders

III. Operations Research *An interdisciplinary branch of applied mathematics and formal science that includes methods such as mathematical modeling, statistics, and algorithms to arrive at optimal or near optimal solutions to complex problems*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Multi-Disciplinary Analysis	• Knowledge of decision science, optimal control, hybrid systems, prognostic and stochastic methods, game theory, data mining, and complex adaptive systems • Knowledge of the validation of non-deterministic automation systems, fault tolerant design and graceful degradation, and large-scale optimization	• Conducts multi-disciplinary analysis and optimization

Table 4
Business and Financial Management Competency Model

I. Business and Financial Management Skills *This competency area includes the basic competencies needed for an agency to manage and report its finances. This section focuses on the skills needed to monitor the overall performance of the organization and adjust the allocation of finances based on progress against specific goals.*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Basic Budgeting and Accounting	• Knowledge of basic budgeting and accounting concepts and principles including agency budget procedures and financial management system(s) • General knowledge of the different methods of accounting including accrual, obligation, and cost • Knowledge of the functions of agency financial systems • Knowledge of the financial management systems architecture	• Applies understanding of budget and accounting terminology and application • Establishes a plan of operations for a fiscal year in terms of estimated cost, with workload data, for a projected program or activity • Appropriately applies budget and accounting principles and procedures to work products • Applies federal accounting standards • Develops, documents, and implements accounting procedures to meet accounting/reporting requirements due to changes in laws, rules and regulations • Efficiently retrieves, uses, and analyzes information pertinent to daily work • Acquires basic understanding of the functional processes of financial management systems being supported (e.g., core financial, payroll, accounts payable, etc.) • Strives for alignment between budget and accounting systems
Financial Budget & Data Analysis	• Knowledge of the methods used to analyze quantitative and qualitative financial data effectively to manage and achieve results • Skill in identifying organizational trends through a variety of sources	• Analyzes financial data in order to make comparisons, draw conclusions, and make decisions • Uses established financial models and tools for analyzing quantitative and qualitative data • Gathers and interprets pertinent data from a variety of sources and identifies trends • Evaluates different sources of information and reconciles conflicting or ambiguous data

I. Business and Financial Management Skills *This competency area includes the basic competencies needed for an agency to manage and report its finances. This section focuses on the skills needed to monitor the overall performance of the organization and adjust the allocation of finances based on progress against specific goals*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
		• Identifies key performance issues and establishes cause and effect relationships to solve complex financial problems for the organization
Financial Management	• Knowledge of critical financial concepts and practices used in the federal government	• Comprehends the fundamentals of financial management • Establishes and maintains realistic budgets • Draws accurate conclusions from financial information • Interprets and analyzes the meaning and implications of key financial indicators • Understands overall financial performance of the organization • Uses financial analysis to evaluate strategic options and opportunities • Demonstrates a broad understanding of financial management principles to direct organizational actions • Identifies cost-effective approaches • Uses cost-benefit thinking to set priorities
Project Management	• Knowledge of basic project management techniques and tools • Skill in creating and maintaining an environment that guides a project to its successful completion	• Executes project start-up and planning activities • Defines and manages schedules, budgets and resources to accomplish project objectives, and reports on project progress • Identifies and manages scope, risks, and quality throughout the project lifecycle • Identifies patterns with stakeholders to develop and implement change management plans • Communicates effectively with project team and stakeholders • Evaluates project success and documents lessons learned to apply to future projects

I. Business and Financial Management Skills

This competency area includes the basic competencies needed for an agency to manage and report its finances. This section focuses on the skills needed to monitor the overall performance of the organization and adjust the allocation of finances based on progress against specific goals.

Competency	Knowledge/Skills Required	Behavioral Indicators
Performance Management	• Knowledge of the principles and application of performance management and cost accounting in the federal government	• Reviews the use and possible application of performance management • Demonstrates how performance measurement can be integrated into the budget process • Demonstrates skill with goal setting, program evaluation, and development of metrics

II. Federal Fiscal Processes

This competency area includes competencies needed which are particular to the financial structure and fiscal cycle of federal agencies. This section stresses knowledge of the federal budget and appropriations process. In addition, it includes competencies related to agency-specific budgeting requirements and management.

Competency	Knowledge/Skills Required	Behavioral Indicators
Federal Budgeting	• Knowledge of the federal budget process, including budget formulation, justification, presentation, and execution • Knowledge of current laws, regulations, and guidance affecting the federal budget process	• Understands the hierarchy of financial authority within the federal government • Uses written, strategic business plans to support financial assumptions • Uses forecasting and historical data to prepare detailed financial plans • Presents the financial planning/budget process and /or financial model to a variety of audiences (i.e. senior staff, Congress) • Prepares analyses and estimates of annual funding needs • Gathers, compares, and correlates data about current and future programs/projects and activities • Assure budget requests conform to agency, OMB, and Congressional requirements

II. Federal Fiscal Processes

This competency area includes competencies needed which are particular to the financial structure and fiscal cycle of federal agencies. This section stresses knowledge of the federal budget and appropriations process. In addition, it includes competencies related to agency-specific budgeting requirements and management.

Competency	Knowledge/Skills Required	Behavioral Indicators
Agency Budgeting	• Knowledge of agency's budget operations and processes, and how obligations and expenditures are incurred for assigned program areas • Knowledge of the structure of appropriations and other funds which support the agency's mission	• Identifies priorities and mandates for designated program area in order to competently estimate spending and manage funds • Assures that obligations incurred and resulting expenditure of funds are kept within the bounds of existing laws and regulations • Develops and applies funds control and internal policies that ensure administrative control of funds • Develops and presents options for maximizing resources in complex operating environments • Explains importance and impact of specific budget and accounting issues to high-level program officials • Understands current program, budget, and accounting issues • Prepares budget narratives and exhibits for inclusion in OMB and Congressional budget proposals • Outlines possible agency responses to potential Congressional questions regarding proposed agency budgets • Awareness of areas outside of the budget which have financial importance to the programs of the agency
Grants Management	• Basic understanding of federal procurement, contract management and grants management	• Identifies and interprets federal policies regarding procurement, contract management, cooperative agreements and grants

III. Financial Systems Management *The competency area includes competencies needed to create, manage, and monitor a functional agency financial system*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Financial Systems Functionality	• Knowledge of the agency's financial systems	• Applies working knowledge of the overall functionality of the financial system(s), and the individual specific supports and interface(s) with other systems in FAA • Applies thorough knowledge of the organization's various financial systems' functionalities • Able to explain how a change in one system affects other systems and how the interfaces between systems work • Able to audit automated financial systems, respond to findings, and suggest improvements to financial systems
Software Capability	• Knowledge of software tools available and ability to identify financial software solutions needed for the agency	• Identifies and analyzes software tools that facilitate the processing or retrieval of financial data • Identifies and communicates technological solution needs and alternatives—including costs and time frames—to IT managers and program managers for mutual decision-making • Evaluates costs and allocates resources necessary to develop/implement financial software solutions

IV. Strategic and Business Planning Skills

This competency area includes the competencies needed to ensure long-term planning is in place to enable the agency to meet future mission requirements. This section highlights the skills needed to anticipate, monitor, evaluate, and make adjustments to programs through use of planning tools

Competency	Knowledge/Skills Required	Behavioral Indicators
Strategic Planning	• Knowledge of the agency's strategic planning process	• Aligns agency finances with agency strategic goals • Comprehends the requirements of federal planning • Applies principles of strategic planning • Participates in and/or leads the development of organizational strategic plans • Ensures cohesive integration of strategic planning, budgeting and financial management Identifies organizational priorities and relate them to resource and budget allocation
Management Processes	• Skill in developing and monitoring processes and organizing resources to achieve desired results	• Evaluates efficiency and effectiveness of resources utilization and results accomplishment • Establishes clear, well-defined processes necessary to achieve desired outcomes • Organizes people and activities to accomplish results • Identifies and addresses process problems promptly • Delineates complex processes into more simple tasks and functions • Creates an effective work flow that effectively coordinates and integrates tasks and functions • Identifies and takes advantage of opportunities to accomplish multiple objectives and obtain synergies through process development and management • Effectively communicates and coordinates with other stakeholders in the process

IV. Strategic and Business Planning Skills *This competency area includes the competencies needed to ensure long-term planning is in place to enable the agency to meet future mission requirements. This section highlights the skills needed to anticipate, monitor, evaluate, and make adjustments to programs through use of planning tools.*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Organizational Forecasting	• Ability to develop models or projections based on studying past results, relationships, outcomes, and data	• Reviews information and data being used to generate forecasts • Conducts analysis utilizing various forecasting tools and methodologies to assess actual performance and quantify risk • Reviews forecasts for accuracy • Prepares forecasting reports and communicates and disseminates them to various stakeholder groups as required

V. Monitoring and Control Procedures *This competency area includes the competencies needed to monitor and analyze risk, and establish management controls over financial information.*		
Competency	**Knowledge/ Skills Required**	**Behavioral Indicators**
Risk Analysis and Internal Controls	• Knowledge of methods used to identify and manage risks associated with errors or fraud in financial statements	• Conveys fundamentals of internal management controls and control techniques • Identifies risks of negative outcomes (including fraud) • Evaluates controls that mitigate risk of negative outcomes through prevention or detection and correction • Assesses and controls unmitigated risks through various methods (e.g., designing and applying tests) • Communicates the impact of identified risks and recommends corrective action
Management Control Concepts and Principles	• Knowledge of management control concepts and principles used in financial systems	• Oversees the recording of transactions in compliance with established management controls • Ensures that resources are safeguarded against waste, loss, or misuse • Maintains a general understanding of the importance of a strong system of management controls • Acquires an understanding of how management controls

V. Monitoring and Control Procedures *This competency area includes the competencies needed to monitor and analyze risk, and establish management controls over financial information*		
Competency	**Knowledge/ Skills Required**	**Behavioral Indicators**
		reasonably ensure that: ▪ Financial integrity is maintained for the recording of transactions and the recording of results ▪ Transactions are executed in accordance with management's general or specific authorization ▪ **Resources are safeguarded against waste, loss, and** misuse
Security Controls	• Knowledge of safeguards in place to ensure secure access to agency financial information	• Implements functional and technical security controls to limit access to financial computer files, tables, and data
Auditing	• Knowledge of the basic techniques of economic analysis, auditing, and program evaluation	• Applies range of benchmarking, analysis, and program evaluation techniques • Explains principles of federal auditing and their application to program management

VI. Financial Reporting and Continuous Improvement *This competency area includes the competencies needed to assess the financial performance of the agency in raising, handling, and using public money. Financial reporting is an important part of governmental accountability. In addition, this section emphasizes the skills needed to bring gradual, but continual improvement to enhance the efficiency and effectiveness of processes*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Reconciliation and Financial Reporting	• Knowledge of established methods used to prepare, review and update financial information for monthly, quarterly, and yearly reconciliation and financial statements, and other financial reports as required	• Identifies and resolves variances in data trends • Analyzes the data used to prepare the financial reports • Creates financial spreadsheets, charts and reports that contain relevant business performance data that can be clearly understood by financial and non-financial employees
Productivity Improvement Systems and Business Reengineering Processes	• Knowledge of methods, metrics, tools, and techniques of business process reengineering	• Reviews, analyzes, and modifies business processes to achieve more efficient operations

Table 5
Contracting Competency Model

I. Acquisition Planning

This competency area involves the processes by which the efforts of all personnel responsible for an acquisition are coordinated and integrated through a comprehensive plan for fulfilling the agency need in a timely manner and at a reasonable cost. It includes developing the overall strategy for managing the acquisition.

Competency	Knowledge/Skill Required	Behavioral Indicators
Acquisition Strategy Development	• Knowledge of preaward and postaward procedures in order to plan the contracting process • Skill in developing and implementing strategies needed to assure that supplies and services are available when needed to meet mission requirements • Skill in advising customers on their acquisition-related roles	• Analyzes and assesses customer/partner acquisition needs • Advises customers on their acquisition-related roles • Develops and documents the overall strategy for managing the acquisition in coordination with the customer/partner
Market Research	• Knowledge of sound market research principles • Familiarity with business practices and market conditions applicable to program • Capable of preparing complete, self-contained technical/economic market research reports • Ability to assess the impact on the market of large Government contracts • Skill in analyzing and providing business advice on the procurement request • Skill in reviewing and providing business advice in the preparation of requirements documents and related elements of the procurement request	• Collects and analyzes relevant market research information from Government and non-government sources to facilitate development of the acquisition plan • Analyzes and provides business advice on procurement requests

1. Acquisition Planning *This competency area involves the processes by which the efforts of all personnel responsible for an acquisition are coordinated and integrated through a comprehensive plan for fulfilling the agency need in a timely manner and at a reasonable cost. It includes developing the overall strategy for managing the acquisition.*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Understanding Sourcing	• Knowledge of the industry(s) to analyze the availability of potential suppliers or develop new sources of supply • Knowledge of negotiation techniques and technical requirements sufficient to procure different types of supplies • Skill in identifying possible sources for the acquisition through effective market analysis and knowledge of suppliers • Skill in limiting competition when it is appropriate to the acquisition situation based on business strategies and market environments • Skill in determining whether to limit competition to small business concerns, eligible 8(a) concerns, or a single 8(a) concern	• Identifies possible sources for the acquisition through effective market analysis and knowledge of suppliers • Uses the appropriate sourcing approach and defines solicitation terms and conditions based on the business strategy • Employs established processes and techniques (e.g., tradeoffs, lowest price technically acceptable) to make well informed source selection decisions • Engages in other source selection activities where required (e.g. debriefing offerors, responding to protests)
Defining Government Requirements in Commercial/Non-Commercial Terms	• Knowledge of legislations, regulations, and methods used in government contracting • Skill in selecting appropriate offer evaluation factors for incorporation into the solicitation that tie back to clear and unambiguous technical requirement included in the Request for Proposals (RFP) • Skill in determining the method of acquisition	• Demonstrates knowledge of and compliance with appropriate federal and departmental acquisition/contracting policies and procedures, e.g., Federal Acquisition Regulation (FAR) • Informs, advises and educates others regarding federal government contracting policies and procedures

I. Acquisition Planning

This competency area involves the processes by which the efforts of all personnel responsible for an acquisition are coordinated and integrated through a comprehensive plan for fulfilling the agency need in a timely manner and at a reasonable cost. It includes developing the overall strategy for managing the acquisition.

Competency	Knowledge/Skill Required	Behavioral Indicators
Solicitation of Offers	• Knowledge of solicitation and selection methods • Skill in conducting oral solicitations and in preparing written solicitations that includes the appropriate provisions and clauses tailored to the requirement and assembled in a format appropriate to the acquisition method and market for the required supply or service • Knowledge of formal advertising techniques • Skill in responding to an inquiry about the solicitation received prior to contract award or a request for information under the Freedom of Information Act • Skill in conducting a pre-quote, pre-bid, pre-proposal conference when appropriate • Skill in amending or canceling solicitations	• Employs methods for obtaining submission of offers of quotations to the Government from industry vendors • Facilitates the process of seeking and obtaining bids and proposals in compliance with applicable laws, regulations, policies and procedures • Facilitates exchange of information among interested parties early on, and throughout the process to improve the understanding of Government requirements and state-of-the-art private sector and academic capabilities • Develops and ensures distribution of proper notices and requests regarding solicitations (e.g., pre-solicitation notice, request for proposal, or request for information) • Employs various methods and tools, such as requests for information and pre-proposal conferences, to facilitate the most effective and efficient solicitation process

II. Contract Formation

This competency area involves the process of drafting and finalizing a contract, a mutually binding legal relationship obligating the seller to furnish the supplies or services (including construction) and the buyer to pay for them. A contract includes all types of commitments that obligate the Government to an expenditure of appropriated funds and that, except as otherwise authorized, are in writing.

Competency	Knowledge/Skills Required	Behavioral Indicators
Defining Contractual/Business Relationships	• Knowledge of techniques in the identification and selection of the most appropriate contractual terms and arrangements; for example, in pricing, financing, and payment methods • Skills to perform the following: o determine whether and how to provide for recurring requirements o prepare unpriced orders and contracts o determine whether to provide for government financing and where necessary the method of financing o determine bonding requirements for the solicitation and contract o determine the method of payment o determine whether a written source selection plan is necessary or desirable.	• Serves as primary point of contact concerning contractual matters • Facilitates discussions between customers/partners and potential vendors to agree on contract terms • Defines and prepares the requirements document • Selects the appropriate contracting financing terms and/or conditions for a given contract • Determines the applicability of a written source selection plan
Detailed Bid Evaluation Skills	• Knowledge of technical requirements sufficient to evaluate bid responsiveness, contractor responsibility, and/or contractor performance • Skill in receiving, handling, and evaluating bids adhering to proper procedures	• Evaluates bids or proposals to make contract award decisions • Manages a sealed bidding process including receiving and recording bids, evaluating the received bids, calculating the evaluated price, and determining whether the low bid conforms to all requirements •

II. Contract Formation

This competency area involves the process of drafting and finalizing a contract, a mutually binding legal relationship obligating the seller to furnish the supplies or services (including construction) and the buyer to pay for them. A contract includes all types of commitments that obligate the Government to an expenditure of appropriated funds and that, except as otherwise authorized, are in writing.

Competency	Knowledge/Skills Required	Behavioral Indicators
Proposal Analysis and Evaluation	• Knowledge of cost and/or price analysis techniques and auditing standards and procedures • Skill in receiving, handling, and evaluating quotations/proposals adhering to proper procedures • Skill in obtaining proper disclosure of accounting practices and in determining if the firm's accounting practices comply with Government cost accounting standards	• Examines and evaluates proposals to make contract award decisions • Applies non-price factors in evaluating quotations, proposals, and past performance • Determines what pricing information to require from offerors • Determines the adequacy of a firm's accounting and estimating systems in making contracting decisions • Assures that a firm properly discloses its accounting practices when required by Government cost accounting standards (CAS) and that the disclosed practices comply with CAS requirements • Uses audit findings to support cost analysis, price analysis, or cost reasonableness analysis and to develop negotiation objectives
Negotiation	• Knowledge of negotiation techniques to meet and reach agreement through discussion with a proposed contractor on the price and performance terms, and to set forth all these terms in a contract document • Skill in conducting a negotiation session and documenting in the contract file the principal elements of the negotiated agreement	• Understands customer/partner's scientific and technical requirements • Gathers information to make sound decisions • Employs established processes and techniques (e.g., tradeoffs, lowest price technically acceptable) to make well informed source selection decisions • Guides customers/partners through the review, negotiation and evaluation of bids and proposals process • Makes award decisions that meet the mission needs of the organization

II. Contract Formation

This competency area involves the process of drafting and finalizing a contract, a mutually binding legal relationship obligating the seller to furnish the supplies or services (including construction) and the buyer to pay for them. A contract includes all types of commitments that obligate the Government to an expenditure of appropriated funds and that, except as otherwise authorized, are in writing.

Competency	Knowledge/Skills Required	Behavioral Indicators
Award Resolution	• Knowledge of contract formation procedures • Skill in determining and documenting the responsibility and non-responsibility of a prospective contractor • Skill in preparing purchase orders/contract and documenting the award recommendation. • Skill in making the contract award and related notification • Skill in debriefing offerors at their request • Skill in acting to resolve acquisition complaints and concerns	• Makes award decisions that meet the mission needs of the organization • Works with customers/partners and vendors to craft mutually agreeable contract terms, conditions and price • Documents source selection decisions and drafts contracts that include the agreed upon terms, conditions, special provisions and negotiated prices

III: Contract Administration

This competency area involves the management of all actions after the award of a contract that must occur to assure compliance with the contract, e.g., timely delivery, acceptance, payment, closing contract, etc.

Competency	Knowledge/Skills Required	Behavioral Indicators
Requirements/Contract Management	• Knowledge of postaward contracting procedures to oversee or ensure compliance with the terms of contracts • Skill in effective communication of contract requirements • Skill in planning for contract administration • Skill in conducting a post-award orientation • Skill in monitoring contractor subcontract management in accordance with prime contract	• Serves as primary point of contact concerning contractual matters • Works closely with customer/partner to ensure terms of contracts are fulfilled in compliance with the terms of the contract and applicable laws and regulations • Plans, directs, coordinates, and manages the various contracting functions, including administering, modifying, closing out and terminating contracts

	requirements • Skill in modifying or adjusting a contract when needed • Skill in determining whether or not to exercise an available option.	
Performance Management	• Familiarity with performance management procedures to effectively monitor and document contract performance • Skill in monitoring contract performance and taking any necessary action related to delays in contract performance or the need to stop work under the contract.	• Applies remedies to protect the rights of the Government under commercial item contracts and simplified acquisitions • Applies remedies to protect the rights of the Government under noncommercial item contracts. • Documents past performance information. • Monitors contract performance and takes necessary action related to delays in contract performance.

IV. Payment and Accounting

This competency area involves the process of assuring payments as required by law to all persons supplying labor or material in the prosecution of the work provided for in the contract.

Competency	Knowledge/Skills Required	Behavioral Indicators
Financial Management	• Knowledge of standards and procedures in financial management. • Knowledge of financial controls to ensure integrity in the bookkeeping process. Skills to perform the following essential functions: • approve or disapprove the request for an assignment of claims • require the contractor to provide a bond or other securities to apply toward completing the contract in case the contract is terminated for cause or default • assure that the contractor receives the appropriate contract financing in accordance with contract	• Works with project officer to develop cost estimates • Uses financial analysis to evaluate cost and price proposals • Selects the appropriate contracting financing terms and /or conditions for a given contract • Tracks expenditures to ensure compliance with contract terms • Analyzes and renegotiates cost/price of contract as appropriate • Understands cost accounting and reporting systems • Understands and monitors the overall financial performance of the contract and draws accurate conclusions from financial information

	financing requirements and related contract performance • make decisions related to allowability of contract cost • adjust the price or fee • determine if cost or pricing data were defective (i.e., not current, accurate, and complete) and implement appropriate remedies • determine whether to authorize payment against an invoice in full, in part, or not at all • refer indications of fraud or other civil or criminal offenses to responsible officials • determine and recover debts from contractors • enforce Government and contractor compliance with special contract terms and conditions	

V. Contract Closeout

This competency area involves the action(s) taken in accordance with the FAR and agency procedures to close the contract and dispose of the contract file after receipt of evidence of physical contract completion.

Competency	Knowledge/Skills Required	Behavioral Indicators
Resolution of Contract Termination and /or Closeout	• Knowledge of contract termination procedures and negotiation techniques to represent the Government in terminations for convenience or default and in claims and settlements • Skill in analyzing, negotiating and preparing a Contracting Officer's decisions • Skill in terminating contracts when it is in the best interest of the Government. • Skill in performing contract closeout	• Analyzes, negotiates and prepares Contracting Officer's decisions • Terminates contracts when it is in the best interest of the Government • Reviews and analyzes settlement proposals, audit reports, technical evaluations, and subcontractor claims • Recommends or determines allowable costs, profit to be allowed, disposal of Government property, and similar issues • Performs contract closeout • Disposes of the contract file after receipt of evidence of physical contract completion

Table 6
General Competencies

I. Communication *The process of transferring information from a sender to a receiver with the use of a medium in which the communicated information is understood by both sender and receiver. It is a process that allows organisms to exchange information by several methods*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Oral Communication	• Skill in expressing ideas orally	• Expresses information to individuals or groups effectively, taking into account the audience and nature of the information • Makes clear and convincing presentations • Listens to others; attends to nonverbal cues
Written Communication	• Skill in expressing ideas in writing	• Recognizes or uses correct English grammar, punctuation, and spelling • Communicates information in a succinct and organized manner • Produces written information that is appropriate for the intended audience

II. Dealing with Others *A category of competencies related to processes for people working together toward common goals and general people skills*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Teamwork	• Skill in working with others to achieve organizational goals	• Encourages and facilitates cooperation, pride, trust • Works with others to achieve goals • Delegates authority and responsibility to increase commitment and achieve collective success • Uses his/her leadership capabilities to provide an effective context within which the team can perform successful

II. Dealing with Others *A category of competencies related to processes for people working together toward common goals and general people skills*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Collaboration	• Skill in working across organizational lines to achieve common goals	• Coordinate separate components • Able to work across organizational lines
Interpersonal Skills	• Skill in relating to others in a way that facilitates the accomplishment of common goals	• Shows understanding, courtesy, tact, and empathy • Develops and maintains relationships • Deals with difficult people • Relates well to people from varied backgrounds • Shows sensitivity to individual differences
Customer Service	• Skill in identifying and meeting customer needs	• Works with customers to assess needs, provide assistance, resolve problems, and satisfy expectations • Knows products and services
Effective Management of Customer Expectations	• Customer service skills	• Considers and responds appropriately to the needs, feelings, and capabilities of different people in different situations • Is tactful and treats others with respect • Identifies and integrates key issues affecting the organization, including political, economic, social, technological, and administrative factors
Influencing/Negotiating	• Skill in persuading others to find solutions to issues and problems	• Represents and speaks for the organizational unit and its work to those within and outside the office • Makes clear and convincing oral presentations to individuals and groups • Persuades others to accept recommendations, cooperate, or change their behavior • Listens effectively and clarifies information; facilitates an open exchange of ideas • Works with others towards an agreement • Negotiates to find mutually acceptable solutions

III. Analytical *Competencies involving the ability to analyze or divide into elements or principles*		
Competency	**Knowledge/Skills Required**	**Behavioral Indicators**
Creative Thinking	• Skill in using different and unique ways to address problems	• Uses imagination to develop new, out-of-the-box insights into situations and applies innovative solutions to problems • Designs new methods where established methods and procedures are not applicable or are unavailable
Decision-Making	• Skill in analyzing information to reach conclusions and decisions	• Makes sound, well informed, and objective decisions • Perceives the impact and implications of decisions • Commits to action, even in uncertain situations, to accomplish organizational goals; causes change
Integrated Thinking	• Skill in applying a systems approach to problem analysis and resolution	• Incorporates not only an understanding of how things work, but also has skill in applying that understanding to day-to-day activities – in other words the systems thinking is "actualized"
Problem Solving	• Skill in identifying problems and using analytical thinking to solve them	• Anticipates, identifies and diagnoses problems; determines accuracy and relevance of information; uses sound judgment to generate and evaluate alternatives • Selects from alternative courses of action • Makes recommendations, and takes action from developed contingency plans
Flexibility	• Skills in adapting to change	• Is open to change and new information • Adapts behavior or work methods in response to new information, changing conditions, or unexpected obstacles • Effectively deals with ambiguity

Table 7
NextGen Leadership Competencies

Items I – IV in the table list existing FAA leadership program **Competencies** and their related **Knowledge/Skill** requirements and **Behavioral Indicators.** It is important to note that of the 16 Competencies that make up the FAA model, 12 are included in the table below as having some behavioral elements that are important to NextGen implementation. All Behavioral Indicators are listed with each Competency but the ***boldfaced italicized*** Behavioral Indicators are the ones the research suggests play a more critical role in NextGen implementation.

Item V in the table below lists the **Competencies** and their related **Knowledge/Skill** requirements and **Behavioral Indicators** for three areas which are covered somewhat by the existing FAA model but which the Panel believes will require a special emphasis on the part of FAA when it considers the leadership aspects of NextGen

I. Achieving Operational Results
Successful leaders apply a variety of techniques to deliver results

Competency	Knowledge/Skill Required	Behavioral Indicators
Accountability and Measurement	• Knowledge of methods and processes used to identify goals and establish accountability systems to track progress • Skill in adjusting organizational operations to capitalize on lessons learned from both successes and failures	• Takes responsibility for achievement of established performance objectives • Acknowledges personal failures as well as achievements • ***Establishes accountability for achieving objectives*** • ***Establishes systems to monitor progress and identify problem areas*** • Reaches agreement with other executives on common goals and mutual accountability • Assesses organizational successes and failures and applies lessons learned
Problem Solving	• Skill in identifying and diagnosing problems and making tough decisions to solve them	• Provides clear direction but gives space for initiative and creativity • Addresses organizational barriers that impede success • Anticipates the impact and consequences of decisions

I. Achieving Operational Results *Successful leaders apply a variety of techniques to deliver results*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
		• ***Analyzes and addresses the interaction of complex variables*** • ***Recognizes organizational and political interests*** • Engages stakeholders in making critical decisions • Makes tough decisions • Seeks win-win solutions in the face of opposing viewpoints • ***Helps resolve problems external to the organization that affect overall FAA performance***
Business Acumen	• Knowledge of techniques used to allocate resources appropriately to correspond to organizational priorities	• ***Justifies resource requirements to internal and external stakeholders (e.g., cost-effectiveness and return on investment)*** • ***Works collaboratively to fund the right priorities from an FAA-wide viewpoint*** • ***Addresses National Aviation Priorities in budget and resource plans*** • ***Allocates and manages human, financial, and material resources effectively*** • ***Makes appropriate resource tradeoffs to achieve FAA long-term objectives*** • ***Tracks costs of doing business***

I. Achieving Operational Results *Successful leaders apply a variety of techniques to deliver results*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Customer Focus	• Knowledge and understanding clients' requirements and focusing on delivering high quality products and service to satisfy those requirements.	• ***Leverages customer knowledge and insight*** • ***Shares information and ideas with customers*** • ***Establishes customer-oriented performance metrics*** • ***Plans for and adapts to changing customer relationships*** • ***Understands the needs, drivers, and constraints of stakeholders*** • ***Understands market and economic factors affecting FAA and the aerospace industry***

II. Leading People *Successful leaders recognize that talented people working together accomplish the work of FAA*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Building Teamwork and Cooperation	• Knowledge of teambuilding techniques to establish and support teams	• Uses teamwork effectively to achieve business results • Capitalizes on the diversity of talent to enhance team performance • Encourages differing opinions to be expressed and respected • Coaches teams toward goal achievement • Equips teams with resources to accomplish objectives • Anticipates barriers and resistance to change and looks for solutions • ***Works effectively across functions and cultures***

III. Building Relationships *Successful leaders skillfully communicate and work with others*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Communications	• Skill in establishing a climate where ideas are openly exchanged	• ***Communicates openly and honestly*** • ***Listens effectively and communicates understanding*** • ***Effectively interprets intent, influence, and non-verbal elements of communications*** • ***Fosters open communication and exchange of ideas and knowledge throughout the organization*** • ***Tailors communication style to fit different groups and circumstances*** • ***Facilitates lateral communication***
Building Alliances	• Skill in establishing networks inside and outside the organization to foster agency objectives	• Represents FAA positions effectively to stakeholders • Understands the organization's impact on stakeholders • ***Fosters networks, alliances, and other business relationships*** • ***Finds and develops common ground among a wide range of stakeholders (e.g., labor, industry, public, international, other government entities)*** • ***Builds and maintains external stakeholder trust and confidence***
Interpersonal Relations and Influence	• Skill in developing and maintaining relationships; seeking consensus and collaboration; and treating others with respect	• Builds and sustains commitment to decisions • ***Collaborates with others to achieve results*** • ***Helps build consensus*** • ***Consistently treats others with respect*** • ***Builds rapport with other leaders*** • Handles emotionally charged or controversial issues responsibly

III. Building Relationships *Successful leaders skillfully communicate and work with others.*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Integrity and Honesty	• Knowledge of the impact of the standards of ethical conduct on leading others	• Acknowledges personal failures as well as achievements • Leads with consistency, dignity, compassion and integrity • Demonstrates and fosters high standards and ethical behavior • Fulfills commitments • Stands behind decisions • Presents viewpoints with courage and conviction • Models commitment to public service and the mission of FAA

IV. Leading Strategic Change *Successful leaders lead fundamental changes in the ways that the organization operates. They are not satisfied with the status quo.*		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Vision	• Skill in far-reaching change	• Builds a shared vision with others across the organization • Communicates organizational direction and priorities clearly • ***Anticipates political, economic, international, technological, and industry changes that will impact mission*** • Pursues opportunities to move the organization toward the vision • Articulates the connection between the efforts of employees and the mission of the agency • Engages others in translating vision into action

IV. Leading Strategic Change
Successful leaders lead fundamental changes in the ways that the organization operates. They are not satisfied with the status quo.

Competency	Knowledge/Skill Required	Behavioral Indicators
Strategy Formulation	• Skill in translating a vision into and actionable strategy	• ***Balances a long-term view of mission and purpose with short-term requirements*** • Determines objectives and sets priorities • Identifies immediate and longer range objectives • Analyzes implications of different strategic options and determines appropriate course of action • Addresses trends and future changes affecting FAA • Translates strategy into concrete action plans that integrate multiple elements and programs
Agility	• Skill in dealing with ambiguity and learns from experience	• Works effectively under pressure (e.g., flexible, adaptable, resilient) • ***Changes viewpoints, behavior and work methods in response to new information*** • Copes with complex or ambiguous situations • Demonstrates a "can-do" attitude to achieving results • Recovers quickly from setbacks • Pursues self-development based on feedback • Learns from experience (failures and successes)

V. Suggested New or Emphasized Competencies		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Public Sector Savvy	• Knowledge of the unique challenges of public sector organizations	• Displays an understanding of unique public sector challenges • Plans for and anticipates challenges • Reacts quickly and appropriately to challenges without rancor or frustration
Complex Project Management (Sub-elements below)		
Strategy and Project Management	• Knowledge of the context of the complex project, and skill in developing a project strategy and system to deliver the client's emergent outcomes	• Establishes the vision and mission statements, and define outcomes • Establishes the environmental scanning system • Selects the strategy • Establishes the strategic project set
Business Planning, Lifecycle Management, Reporting and Performance Measurement	• Skill in developing and implementing the project business planning, reporting, and performance measurement systems	• Designs and establishes the business planning, lifecycle management, reporting and performance measurement systems • Provides ongoing leadership and management of the business planning, gate review, lifecycle management, reporting and performance measurement systems • Provides ongoing management of the strategic business plan and budget to maintain achievement of strategic outcomes • Establishes project exit criteria • Implements appropriate procurement strategies

V. Suggested New or Emphasized Competencies		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Change and Journey (Leading Change/Change Management)	• Skill in planning and constantly adapting strategy and implementation plan along the journey • Skill in identifying project internal and external stakeholders • Knowledge of stakeholder positions, values, objectives, key influencers, cultures, resources, competencies, decision making process and political approach • Skill in analyzing stakeholders using rich pictures and cause and effect diagrams • Skill in using integration techniques (bringing together individual stakeholder views) to understand stakeholders	• Defines culture of the project environment including key values and their hierarchy • Classifies the program and sub-projects by size, risk and complexity • Determines the scale of change required in project environment and the rate of change that is needed • Classifies the level of impact, uncertainty, risk areas, and resistance to change • Develops the change and journey management strategy to fit with the project culture and leadership style • Establishes the change and journey management system • Establishes the stakeholder management strategy and plan • Establishes the communication strategy and plan • Uses pilot projects to link project values to outcomes to create new symbols of behavior • Uses double loop learning
Innovation, Creativity and Working Smarter	• Skill in designing, developing, leading, and managing a project organization that delivers innovation, creativity and continuous improvement in projects that are complex and non linear / recursive in their nature	• Drives innovation throughout the organization • Identifies key innovative opportunities • Evaluates innovative opportunities • Drives continuous improvement • Thinks outside the box and encourages creative approaches • Employs benchmarking / best of breed • Uses design management
Organizational Architecture	• Designs, establishes and manages the organizational architecture for complex projects.	• Designing the project organization • Establishing and managing the project organization • Developing project maturity • Strategic human resources management

V. Suggested New or Emphasized Competencies		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Systems Thinking and Integration	• Knowledge of and skill in applying systems thinking concepts in the project management of complexity	• Classifies systems by type • Applies systems thinking using a contingency approach • Integrates appropriate systems thinking philosophy in designing the project organizational architecture • Designs the organizational architecture to fit with chaos and uncertainty • Implements systems thinking • Plans for high uncertainty • Plans for a project which exhibits characteristics of complexity and chaos
Leadership	• Skill in applying and adapting leadership principles and concepts to the management of complex projects	• Understanding • Sculpturing (shaping views and perceptions of the project) • Mobilizing • Inspiring • Situational Leadership
Culture and Being Human (understanding cultural and people issues affecting the project)	• Knowledge of the cultural composition of stakeholders and key people • Skill in designing systems to fit with cultural differences • Skill in building the project cultures on existing national and organizational cultures • Skill in using the culture's hierarchy of values when making decisions and designing organizational processes	• Understands and integrates international cultural differences • Uses cultural values (national, organizational, and sub cultures) to understand people • Applies knowledge of project's people and stakeholders in systems/process design • Conducts personality profiling to understand people and to design the project organizational architecture and change/journey • Applies knowledge of human lifecycle stages to understand people

V. Suggested New or Emphasized Competencies		
Competency	**Knowledge/Skill Required**	**Behavioral Indicators**
Probity and Governance (Integrity and exercise of authority)	• Understands the proper use of authority • Knowledge of ethical requirements demanded of his or her position.	• Establishes probity and governance statutory and organizational requirements • Defines project specific probity and governance requirements • **Designs probity and governance systems** • Manages ongoing probity and governance

Collaborative Public Management	• Skills in:
	• Building sustainable relationships
	  • Networking
	  • Managing through influencing and negotiation
	  • Managing complexity and interdependencies
	  • Managing roles, accountabilities, and motivations
		• Communicates to create shared meaning
		• Displays understanding and empathy
		• Successfully resolves conflict
		• Displays creativity and innovation
		• Uses empowerment
		• Builds trust among all partners

SUMMARY OF INFORMATION GATHERED DURING PHASE II

Table 8
Summary of Information Gathered During Phase II

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
Systems Engineering		In a nutshell we need really excellent system engineers, which we don't have at the moment anywhere.	Systems Engineering, Systems Engineering, Systems Engineering....can't stress it enough...FAA is not strong in this discipline and in my opinion is the biggest gap...related to this is requirements development - another huge Gap at FAA.....bottom line, need a stronger Systems engineering workforce to not just define what it is but to help design, develop, integrate, test and implement…	The most important skills are systems engineering skills. Clearly, the FAA is a very complex system of systems. Making large improvements in one segment with expenditures of billions of dollars may not make any significant difference in the overall performance so the problem needs to be well defined and analyzed by talented systems engineers as smart buyers from industry and people who can clearly define and manage requirements so have any hope of delivering real improvements that will be noticed by the users, stakeholders and traveling passengers.
		Eventually they need to have really strong system engineers who can integrate all the components of NextGen. They need a whole bunch of new skills.	NextGen is one big huge systems Engineering problem…	Emphasize the need for engineering and other technical skills. Systems engineering, where the workers can anticipate the impact of specific changes on complex technical systems, will be in high demand.

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
		FAA really needs to begin recruiting system engineering talent and building a team quickly.	Need to increase the number of trained system engineers, especially in the areas of needs analysis and requirements development.	This is not an IT or and engineering problem...it is a systems engineering problem
Program Management		What is lacking at FAA is strong program management skills.		Clearly, program management skills are needed as well and program managers need to be selected who have clearly demonstrated experience in managing very complex projects and delivering products to skeptical users as the skills are very different from those needed to deliver systems where requirements are more easily frozen.
		You need program managers that are technically astute to manage technical programs. It is not enough to undergo program management training without the necessary foundation in technical disciplines. A program manager needs to understand what it takes to develop and integrate a system as well as have the program management skills, which can be learned from certification programs.		Need excellent Program Management skills, which not only includes folks who know how to manage programs on a daily basis (Earned Value Management, schedule management, cost management, risk/opportunity management, etc) but also need folks who are excellent communicators.

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		Program Management has to be pushed from the top as well. Senior leaders have to know what it is that they are buying. If it is not what they want, they have to be able to explain what it is that they do want.		Top Management would need Program Management skills; ability to develop long term strategic goals; short term tactical goals; ability to hold their management team accountable to these goals (providing or withholding bonuses based on specific goals); and ability to communicate the office's goals inside FAA and to their stakeholders (OST, OMB, Congress, Industry).
		For NextGen, critical competencies are project management, auditing, and contract management.		Middle Management must be certified and credentialed Program Managers.
Systems Integration (see Section 3. Systems Integration for more information on this topic)	Systems integration experience is a primary requirement.	FAA does not have adequate systems integration expertise for NextGen.		Portfolio management is needed—not just program management. The main difference is the distinction between planning vs. execution of the plan. FAA creates lots and lots of plans. They do not execute the plans well. 80% of CEO fail because the execution wasn't there.

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
	What is needed is the business/financial piece of planning the transition and integrating it all with the technology piece.		Systems should be developed using industry standards. Employees should be encouraged to learn more about the standards bodies and how they work. They should participate more in the development of standards.	Some of the skills needed in Systems Integration and Implementation: Large-scale systems integration, program and project management, NAS domain knowledge and experience.
			Avionics and pilot role in system.	System integration is essential….in every sense of the term.
Software Development		While FAA has come a long way over the years, software development remains the organization's Achilles heel. NextGen represents a fundamental change in how we develop, integrate, and use software technology, and it will be a very complex process. The challenge for FAA is developing	Since the development of NextGen is primarily a software project, the skill to analyze algorithms and the trade-offs involved, is the most important skill in the critical development area. By critical development areas, I mean those areas for which solutions don't exist. Other areas, such as	
Software Development (cont'd)		these complex software-based systems and finding the talent to supervise these systems. Software development is a field that requires people with subject expertise; you cannot just pick a random person to head a software development initiative. But the key for NextGen is finding someone	communications and GPS, while they require great skill, don't require the same degree of creativity.	

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		that has that knowledge, but is also a good manager with experience managing complex programs.		
		Recruit talent from universities like Indiana University and Northwestern University that have major aviation programs. Stanford University and MIT have strong transportation and software programs.		
Computer Science			Computer scientists that can design the data that will be used in the system and the algorithms that can manipulate it accurately and efficiently.	Strong analytical skills and background in Computer Science
			The FAA needs to be competent in mobile networks in order for NextGen to succeed.	
			People: Add to work force recently graduated electronics/computer engineers and computer scientists.	
Information Security			The skills needed are creativity, independence, understanding of computer science design issues, mathematics, and engineering.	

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
			Security is not mentioned. Even though most people have a basic knowledge of information security there is a lot to be discussed.	
Human Factors		They will have to deal with the human resource and human factors, which are very significant for this NextGen system.	Human factors analysis. A system design is significantly impacted by the human interface. This is true of both ground and airborne systems.	Requires strong analytical skills and background in Human Factors.
		With regards to the human factors issue for NextGen, I would talk to Embry Riddle. They have a large cadre of students aspiring to be pilots and air traffic controllers and understand some of the issues that you are likely to hear from the unions.	Human factors and risk analysis are very important to these proposed changes of NextGen.	
Prototype and Modeling		FAA should push themselves to come up with prototypes and models for NextGen—so people will start getting excited about it.	Conceptional Modeling must involve all stakeholders (developer, users, etc).	Next in priority, I would urge the FAA to set up a simulation of the system with the ability to insert various technologies in both software and hardware so that requirements can be refined by prototyping in a simulation environment before buying. This will require people who are experts at setting up and managing simulations. NASA is very good at this but does not have the

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
				resources or infrastructure to carry it alone.
			Need to build prototypes in integration labs for everyone as a way to increase overall competency.	
Contract Management		For NextGen, critical competencies are project management, auditing and contract management.	Serious consideration must be given to the Contracting Office resources that will be required for procurement relating to the NextGen effort... i.e. one Contracting Officer handling all NEXT GEN requirements? An entire contracting office dedicated to the effort?	
Business Case Development	It is also important to develop business case development capability within the agency and within ATO.	Business case development expertise. An important competency for business case development is discipline. Also. in order to do your business cases you need project planners and that is one of the challenges that OMB has had because people that put together the plans in the past were engineers.	Knowledge of the business case of NextGen.	Business management skills and experience.
	The agency also needs people with business/finance expertise. Business acumen is important		Business case	

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
	for negotiating deals and making "break throughs" with stakeholders.			
Crosscutting Knowledge/Skills Mix		For planning the evolution of NAS, you need a mixture of skills and talents. You will need smart people with operational understanding and a wide range of skill sets. This means that they should be able to understand air traffic operations, systems maintenance, logistics, and systems integration, just to mention a few.	Knowledge of other systems - Air traffic needs to be coordinated with avionics, and vice versa.	Requires strong analytical skills and background in Engineering, Human Factors, Computer Science, and Project Management

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
				Innovation and research: multi-disciplinary analysis and optimization, human systems integration, human performance and error modeling, dynamics and controls, decision science, optimal control, hybrid systems, prognostic and stochastic methods, game theory, highly dependable software engineering methods, formal V&V methods, data mining, complex adaptive systems, validation of non-deterministic automation systems, fault tolerant design and graceful degradation, network flow optimization, large-scale optimization, modeling and simulation, weather prediction and modeling, communication, navigation, and surveillance.

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
Cost Benefit Analysis		You also need people that can do cost-benefit analysis. That is because agencies need to demonstrate that investment will translate into benefits in the long-term.	Critical skill/competency for NextGen is developing accurate cost estimates for NextGen solution sets; but, first the components need to be defined at enough detail in order to estimate costs. This is the current dilemma. Programs need to justify funds for the out years, yet the individual component/systems are not well defined...how can you cost something to any degree of accuracy that is not defined....we account for that by adding risk....more funds. More fundamentally, the benefits have not been well defined for the NextGen program at the aggregate level, let alone at the lower...	
Multi-Perspective		Systems engineers need to have cognitive flexibility to look at things from multiple perspectives (need to know what it takes to upgrade a system and what else is needed to maintain a system). Systems engineers don't need to simply verify and validate.	Ability to synthesize work from several different perspectives (ground ATC, cockpit, etc) is necessary	Insure all major participants have a clearly defined, clearly articulated, understanding of the scope, schedule and objectives of Next Gen from a user's perspective

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
Risk Management		Managers should work to reduce risk versus managing to cost and schedule. The future of work will need risk based management versus requirements based.	Risk Management should be its own separate competency. Since some view management risk different from technical risk—it should be in both Program/Project Management and System Engineering—to reduce conflict of interest issues.	Explain the risks and how to mitigate them and this will build credibility among stakeholders
			Human factors and risk analysis are very important to these proposed changes of NextGen.	

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
Adaptability		With regard to NextGen—he explained that FAA should focus on requirements for an adaptive system (not a stable system). Architecture and testing & evaluation should also be adaptive (for both software and systems). Traditional program management will not be sufficient for NextGen. FAA governance needs to be structured to support this. Managers should work to reduce risk versus managing to cost and schedule. The future of work will need risk based management versus requirements based. There are incremental commitment models available—it is tough to manage with FAR regulations—but it can be done.	Agile adaptability - Responding to changes rapidly, and efficaciously from a financial and technologic point of view	
Information Architecture			Information Architecting; Information Frameworking	
NAS Knowledge		It is important that they have the technical knowledge, because failure to understand the current system makes it difficulty to understand what is realistic in planning the	The National Airspace System (NAS) itself could be considered a specific technical field. One of the hardest things to find in engineering personnel is a good understanding of the	Sufficient NAS domain knowledge needed.

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		evolution of the national air space system.	overall NAS - its various systems and the overall concept of NAS operations. This is important because of the complex, interrelated nature of NAS components. It's often difficult to successfully perform tasks on any specific NAS segment without a working knowledge of the overall system. How do you know...experience is the most important thing to look for. Need ability to: recognize complex interrelationships among NAS systems; develop operational concepts that successfully integrate into the NAS; identify integration risks.	
NAS Knowledge (cont'd)		I think that in some places in FAA there are very competent people that understand NAS; however, I believe that in the planning organization—JPDO and ATO-P, for example—the people generally doing the planning fundamentally don't understand NextGen well. The biggest weakness lies in those translating the vision into the plan and execution. FAA/ATO needs people with a better		

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		understanding of the NAS to head the planning and execution of NextGen. I don't think it matters where the vision is mapped out – whether inside or outside FAA/ATO. The important thing is to have the right people do the planning and the mapping of the vision.		
Lessons Learned			It is extremely important that in order to avoid the mistakes that we have made in implementing programs/projects in the past to recognize why they failed and attempt to eliminate those mistakes. Accordingly, a comprehensive Lessons Learned course would be of great value to futuristic thinking and implementation of Next Gen concepts and improvements.	We must use lessons learned to define a new type of integration contractor and contract vehicle.
				The mistakes of the past must be avoided.
Requirements Analysis			Functional and requirement analysis - about 80% of project failure due to improper requirements identification and	

1A. TECHNICAL COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
			development.	
			Need to increase the number of trained system engineers, especially in the areas of needs analysis and requirements development.	
			FAA is not strong in this discipline [systems engineering] and related to this is requirements development - another huge Gap at FAA	

1B. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase 2 interviews	Focus Groups	Colloquia
Political Savvy	Another required competency is in the area of negotiating the navigating through the political waters that come to bear with any air transportation endeavor.		Avoid getting "sucked into" basing future performance requirements more on [external] political pressures than actual operational needs. [Of the 400 radar districts, 10% do not need to be there but are there because of Congressional mandates.]	The leader needs to obtain the resources needed to execute the project and must have the political connections to keep the project sold to the funders.

IE. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
				Garner the support of political stakeholders and come to a shared understanding of what NextGen is and how it benefits the Nation. Establish relationships with Congress/OMB/other oversight groups and keep them apprised of progress and issues.
				Understanding of the congressional process needed.
Technical Leadership/Complexity		DOD has recently looked at 52 programs (the size of NextGen or larger such as Joint Strike Fighter & Deepwater) to find out what is going wrong. They found there is a lack of technical leadership. But where does one send people to get technically smart? Imagine a business leader knowing what s/he needs to know about network technology to get the job done. Some type of leadership lab is needed to help leaders apply more than just the theory to manage complex systems—to actually do it (through gaming/ other ways).		The FAA needs to attract and hire a cadre of experienced senior level system executive program managers with successful (!) experience in large, complex, mission critical systems. They must be given leadership responsibility and accountability over all major components of the system and held responsible for its success.

1B. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
		The only advice I would give perhaps is that the agency emphasize technical expertise over program management expertise.		The world is not replete with folks that understand this technology....they and few and far between. The FAA must be willing to identify and capture these folks and bring them into key leadership positions.
		Sometimes I wonder if FAA really understands how technically complex NextGen will be.		Firstly, [leaders need] technical competence.
		But the key for NextGen is finding someone that has that knowledge, but is also a good manager with experience managing complex programs.		Program managers need to be selected who have clearly demonstrated experience in managing very complex projects
Next Gen Awareness		FAA needs a new cadre of skills who will understand the issues of NextGen		
Collaborate and Coordinate			Include all the proper players (in planning process and elsewhere)!	Enable effective cross-organizational collaboration: influence and negotiate.
			Establish a clear "path" for NextGen that has buy-in from all stakeholders.	Be truly collaborative.
			Collaboration—communication—trust.	Ability to work across organizational lines.

1B. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase 2 interviews	Focus Groups	Colloquia
			Understand what your group is doing, and how that relates to work elsewhere.	Industry will play an extremely important role in this process. It is important to treat them as teammates. Treating all subcontractors suspiciously hurts morale of the team. Need to stress the importance of this to the PM teams. Successes should be celebrated jointly. Incentives should be put in place for both FAA and Industry teams. Striking win/win deals amongst FAA and industry will be very important.
			Coordinate separate components for compatibility (and no duplications). For instance, is parallel approach monitoring best performed in the airplane by pilots, on the ground by controllers, or both? If both are used, are they compatible?	ADS-B is a classic case-in - point—community and FAA need to both invest in the product. User doesn't see the benefit and so we get all the comments to the rule-making. The agency didn't want to listen to what people had to say. Trust, confidence, planning is needed.
			Ability for ATO to manage cross domain development and activities.	

1B. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
			Again, its systems engineering...leadership, matrix management, collaboration, collaborative decision-making, change management ...plus the incentives to do all this...needs to start at the top with the ATO Leadership.	
Collaborate and Coordinate (cont'd)			EC has to work together and lead by example....work cross organizationally, remove boundaries, remove individual organizational agendas....make shared goals	
			Ability to manage both external commitments as well as internal requirements of a program with equal importance	
Communication	ATO has not focused adequately on strategic communication of NextGen. Instead, the organization has focused on the "nuts and bolts", meaning the technical aspects of NextGen rather than the broader strategic idea of the future system.	It is essential that ATO take the leadership role in communicating NextGen. Part of getting buy-in from stakeholders is based on operational improvements to the system as well as improvements to the reliability and safety of the system. This means that the communication strategy has to be ongoing and always	Acquire and convey to their workforce a clear vision of what NEXTGEN is and their organization's part in it.	The PM teams need to work collaboratively with many other groups in the FAA, and without crisp/constructive communication, the programs) will fail.

18. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
		seek to demonstrate the safety and reliability benefits of NextGen.		
		FAA seems to be frightened to fully communicate the NextGen vision. Even people in high circles within government and industry cannot clearly articulate what FAA is. Maybe FAA's inability to effectively communicate NextGen is attributable to the lack of a business plan.	Communication to all team members and establish roles and responsibilities for each member.	[FAA needs] leadership skills that encourage dissenting points of view. Also need the ability to ask the right questions.
			Keep the FAA workforce (as well as the flying public) appraised of the intent and progress of the NextGen effort. Hold status sessions (every four-six months) on where we are with NextGen	Communicate clearly to all constituents the forward plan for NextGen

18. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
Communicate (cont'd)			First understand what it is and be able to communicate what it is throughout their organizations and provide the vision for how their organization fits into the NextGen equation...be champions, set the vision, empower their people, provide incentives, remove roadblocks...etc. basically provide transformational leadership. Bring in stakeholders and collaborate.	Strong communication skills needed.
			Be able to clearly explain the roles (and importance) of the leader's organization in achieving NextGen	Solicit/allow input from the workforce...with the understanding that not all input will result in adoption of ideas, but all will be considered.
			Define for each occupation how what they are doing makes a difference in mission success (each employee should see how their part contributes to the NextGen whole)	
Vision	The organization [FAA/ATO] needs people that understand the challenges associated with the operations of NextGen, but that are also	The biggest weakness lies in those translating the vision into the plan and execution....I don't think it matters where the vision is mapped out – whether inside	Ensure a common vision by training the workforce on NextGen and how they fit in to it. Leaders should invest the project team members with an understanding of how	A clearly articulated vision for NextGen that shows a "before and after" picture of operations will go a long way to capturing the hearts and minds of all those involved.

16. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
	visionary and will always seek to find ways of improving ways of doing things.	or outside FAA/ATO. The important thing is to have the right people do the planning and the mapping of the vision.	they contribute to both programmatic and enterprise levels success	
			Leader needs to be the flag carrier, not the wrench turner.	The leader must embody the vision for NextGen—not just walk the talk but internalize it and live it every second of every day.
Decisiveness			Leaders need to have a clear understanding of NextGen vision and goals; and what's needed to accomplish it.	
			Listen to your testers and engineers, be realistic in establishing program schedules and assessing task progress, do not be afraid to say "No" when that is the appropriate yet politically inexpedient answer to give management.	Ability to take charge and make decisions after getting input from all involved parties
			Need to establish standard platforms and procedures for across the board which will allow consistency from one program to another.	Insure all major participants have a clearly defined, clearly articulated, understanding of the scope, schedule and objectives of Next Gen from a user's perspective

1B. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
				Top level management must be clear that systems are not developed by consensus, and individual objectives must be traded and conditioned to provide the greatest benefit to all.
				Ability to make decisions. Decide and start executing. Make incremental changes without waiting for everything to happen. A simple example is the JPDO development of concept of operations. If a concept takes 3 years to develop, imagine the number of years and $ needed to execute it.
				Have to listen long enough to get the answer and then make the decision and move forward
Team Building/Talent Management		FAA really needs to begin recruiting system engineering talent and building a team quickly.	Leaders need to be able to hire good people, motivate them, and let them do the job they were hired to so. In the government, alas, this is unlikely to happen.	Build a management team that actually works together, not in stove-pipes, and are also committed for the long haul.
		Every line of business should be supported by strong teams, and there should be some effort spent on ensuring some evenness in the quality of	Being able to obtain the talents needed to solve the NextGen needs.	[Leaders need] the ability to surround yourself with smart people.

18. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
		workforce across the lines of business.		
			Staff the key NEXTGEN projects with their top management personnel.	
			What is the barrier to obtaining the talents needed to solve the NG needs: Attracting and retaining the talent. Why? We end up with prices that are so low that we can't contract the people we need. We have dwindling federal workforce and sometimes the people are simply not there.	
			Prioritize hires - technical versus staff.	
			Recognize/reward the performance we seek.	
			Team environments - everyone needs to have an understanding of each team member's competencies and needs - leads to integration of ideas and thoughts to collaboration – success.	

18. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
Planning		We need to start setting milestones along the way and timelines, rather than continuously churning things.	Ensure that proper financial and human resources are secured to allow things to progress smoothly	Some of the skills needed in Planning and Management include: Program and project management, contract (procurement) management, policy making, systems engineering, systems architecture, systems safety, human factors, test and evaluation, certification and V&V, standards definition, regulation, and rule making.
		The agency will need to develop an aggressive strategy for managing the transition to NextGen to ensure that it is on track and on budget. They will have to deal with the human resource and human factors, which are very significant for this system.	Submit realistic schedules and budgets	Need to be able to focus the abilities of different organizations on the objective to deliver NextGen on schedule
			Provide the appropriate resources required for testing of NEXTGEN programs.	Identify a clear collection of strategic goals.
			Establish realistic and pragmatic goals that are attainable, and a timeline that makes sense	

1B. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
			Congress is throwing money at NextGen now...but if plans don't develop well and early products do not roll out as planned, likely funds will slow or be held.	
Continuity			When you look at past projects and implementations, there was a great degree of waste and time lost because managers and Directors would only remain on a project for a short period of time and then they would move on to another position or another project. I feel that Next Gen has to be done differently. In order to make Next Gen successful you need to have continuity for managers and leaders to remain in place for longer tenures and not suffer from constant loss of continuity.	People work best when the objectives are clear and stable. The leader/s must be committed and visible in their support for the objective. The notion that everyone who is in a leadership position will retire at or near age 55 [so will not have to live with the consequences] argues for employment contracts and/or younger leaders.
Flexibility			Extremely important that whoever is in charge of a particular project or aspect of Next Gen to remain in place for the length of the successful completion of the project or practically speaking, to remain as long as	Stick around for the long term to see it through.

1B. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase 2 interviews	Focus Groups	Colloquia
			possible in order to effect a more likely outcome	
			Take the time to do it right when it comes to following the procedures and processes. Don't cut corners but be open to new ideas that meet the intent of the procedure and process	
Creativity			In any new and complex system, the development of a viable solution is the most challenging aspect. The development can be broken down into two areas: those for which solutions are known and those which need to be developed. Areas such as data acquisition and communications, while they may be difficult, should be easy to find people to handle. The core idea of the system, namely to redesign how air traffic is handled, is much more difficult to find people for. The difficulty is that not only must the people be	Recognize that achievement of NextGen requires "out of the box" management approaches that the FAA has historically resisted.

3B. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	**Phase 2 interviews**	**Focus Groups**	**Colloquia**
			competent, but much more importantly they must be independent and creative…. The skills needed are creativity, independence, understanding of computer science design issues, mathematics, and engineering.	
Authority and Accountability				Ensure that managers have the authority needed and are accountable for performance.
				Must give the NextGen leaders the responsibility and accountability for delivering their tasks. The Free Flight model worked very well for URET.
				Deliver promised capabilities on time.
				There needs to be a Mr. or Ms. NextGen with full authority, adequate funding and resources, and full accountability for the success of the program. There is no single point person at FAA or anywhere else today.

1B. LEADERSHIP COMPETENCIES				
	Specific Comments			
	VP roundtable	Phase 2 interviews	Focus Groups	Colloquia
Transparency				Be transparent—it goes a long way to building trust with stakeholders, from DOT to OMB to GAO to the Hill. At IRS, we provide a lot of documentation, including quarterly face-to-face reviews, but also monthly project and program review documentation that is not filtered in any way. Do not try to hide anything - show your risks and how you are mitigating them. Builds confidence that you are managing effectively, even if you are not meeting milestones.

2. STRATEGIES FOR ACQUIRING COMPETENCIES NEEDED FOR NEXTGEN				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
CO-OP Program		One strategy is to have CO-OP programs to get students interested in the work of the FAA. Air Traffic wants to develop a pre-development program similar to the CO-OP program (entry and midlevel hires would go through the same programs as the CO-OPs). They are recruiting from the inside for these positions.		

2. STRATEGIES FOR ACQUIRING COMPETENCIES NEEDED FOR NEXTGEN				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
Engage Colleges and Universities in FAA Research Projects		If FAA does bring some of its work to universities—FAA should choose the most interactive and exciting areas to showcase to the students.		Innovation and Research must be lead by federal research centers and affiliates (NASA, NOAA, DOD, to name a few) and academia.
Increase Recruitment and Marketing Activities	It might be useful for ATO to develop a recruiting group that would be charged with developing creative ideas to recruiting and hiring new staff.			
Competencies Tracked to Curriculum		NASA is starting to track where they do their corporate recruitment (competencies tracked to degrees to institutions which offer these degrees). NASA is working to be more strategic to target the right University departments. However, in many of the fields NASA needs—there aren't enough universities that offer the degrees needed to fill the positions. NASA is working to shape some of the university programs offered. This year NASA hired a professor to map their competencies against degree requirements. The plan is to shape the calls for scholarships to reflect the skills		

2. STRATEGIES FOR ACQUIRING COMPETENCIES NEEDED FOR NEXTGEN				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		NASA will need.		
Tracking Students Engaged in FAA Education Activities		NASA is working to track students continuously from the middle and high school level. It is important for agencies to have a strategy for how they will track students as individuals—how they will monitor that data and make sure the agency uses it in the way that they have promised. NASA has set up a new process so that with every new hire the project managers have to list which Education programs the students came out of and to plot where the employees will go next. This is a change for project managers. The information is tied to the project manager's performance plan—and encourages employees to support more of the education programs.		

2. STRATEGIES FOR ACQUIRING COMPETENCIES NEEDED FOR NEXTGEN				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
Rotational Assignments		There needs to be cross fertilization of skill sets. For example, employees in the contracts office should have rotations in the finance office. That is the best way to grow leaders. If employees are forced to move to different offices there will be stronger managers in the pipeline.		Move people from one organization to another to understand the challenges others have.
Use Flexibilities Already in Place	While the ATO is a unique organization, very different from government agencies. Its recruiting nonetheless is performed by the FAA-wide HR office—an organization entrenched in government protocol. This tends to hinder ATO and may even stifle creativity and flexibility to explore. The solution may either be for ATO to get its own recruiting office or for the FAA-wide HR office to have different approaches for hiring ATO personnel.	FAA has an advantage in the federal service in that it has a lot of flexibility in hiring. Yet, they are not very good at exploiting these opportunities to the full extent.		

2. STRATEGIES FOR ACQUIRING COMPETENCIES NEEDED FOR NEXTGEN				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
Infuse FAA with Outside Leaders				IRS got special authority to bring in outside experts to bring in outsiders (4 year appointment)—critical pay authority and expedited process. Executives were brought in (partnership model) and a combination of one insider/one outsider runs the team. If only the outsider runs it—s/he doesn't understand the organization. It has worked well. Now pushing it down and doing it at the worker level.
				Bring in some outside leadership at executive level with experience in large-scale systems integration that are paired with solid internal people (a very big win-win of bringing outside perspective that quickly comes up to speed by working hand-in-glove with insiders).
				For the first 6 months have the executives keep their mouths shut—and listen and learn about the culture. I've seen significant change in the IRS culture over the years.

3. SYSTEMS INTEGRATION				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
Structured Development Process			Several items in play today will facilitate future integration efforts - open systems design, modular development, etc. System thinking is critical to overall integration , but a commonality of development approaches would ameliorate the process	
Interoperability		Systems integration is a key function that will be required to implement NextGen. NextGen will involve several components. The challenge for FAA will be figuring how to integrate all those different components and technologies to ensure that they all sing and dance to make NextGen a reality. At the same time, there are other non-NextGen related technologies that are being mandated for the aircraft industry, and which will need to also be considered in the systems integration effort for NextGen. Furthermore, FAA will need to figure out how to	Attention needs to be given at the outset to selection and implementation of networking protocols, and operating system interoperability. The more heterogeneous the system of systems is allowed to range in these areas the more difficult will be the task of getting the various system element to place nice with each other. Historically, FAA takes a hands-off approach and leaves these up to each individual system solution provider, so as not to unduly influence them.	

3. SYSTEMS INTEGRATION				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		work with the various signal systems involved with NextGen. While NextGen will be net-centric and satellite-based, there will still be a backup radar system. This means that	That approach could lead to less than optimal results under NextGen.	
Interoperability (cont'd)		aircrafts will have satellite feeds as well as radar feeds and signals. All those signals have to be integrated perfectly. I am worried about their ability to integrate these systems effectively given that ATO's program offices operate in stove pipes and hardly collaborate.		
			In order to integrate a system seamlessly, that system has to be designed seamlessly. What I mean by that is that the system has to be designed as a coherent whole. This is not a task that can be solved by having more people with better skills. The system itself has to be designed by as few people as possible. Many different and diverse inputs will only lead to a system that has many and	

3. SYSTEMS INTEGRATION				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
			different pieces. In such a system integration will be impossible. Integration is not an issue to be addressed after all the parts have been designed; then it is an impossibility.	
Training		If they [pilots] are going to be responsible for making some of the decisions that air traffic controllers make today then they should be trained in how to make critical decisions in split seconds.	Need to have better training in integration technologies, and work with competent support people	Provide training and develop opportunities to allow existing employees to ready themselves to support NextGen.
Future Vision		There is so much talk from FAA about how ADS-B forms the foundation of NextGen, but very little discussion on how it will be implemented and integrated with all the other components of NextGen. I feel like I have heard so much about the foundation, now I want to see the house that goes on top of that foundation.		
Complexity		NextGen represents a fundamental change in how we develop, integrate, and use software technology, and it will be a very complex process. The challenge for FAA is	Need ability to: recognize complex interrelationships among NAS systems; develop operational concepts that successfully integrate into the NAS;	NextGen requires the single most complicated large scale integration of components and systems, users since the Apollo Moon program of the 1960's. This is compounded by a

3. SYSTEMS INTEGRATION				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		developing these complex software-based systems and finding the talent to supervise these systems.	identify integration risks.	mission that spans multiple user union communities, at least two Federal Agencies, private airlines, pilots, and the flying public - none of which challenged the Apollo program. NextGen will not succeed as it is currently defined. It requires commitment by the President, bipartisan support and funding from Congress, and single-minded leadership and focus commitment at the Cabinet level. This must be treated like the Moon Program, or like the marshalling of industrial might for World War II. If the FAA believes this an overstatement, then many Agency employees will get busy, a lot of contractors will make a lot of money, and ten years from now a panel like this one will meet to discuss how to get NextGen on track.
Outsource vs. In-House Lead Systems Integrator				FAA must place a priority on modernization and a willingness to hold people accountable for the system-level product. You cannot outsource the "program" responsibility but you can

3. SYSTEMS INTEGRATION				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
				outsource the program activity and perform the system integration with a combination of FAA and industry.
				Systems integration and implementation must be led by industry.
				The federal government needs to oversee and manage this critical program with a set of contracts that do management and systems engineering. What does the FAA mean by lead systems integrator? We must use lessons learned to define a new type of integration contractor and contract vehicle.
				FAA must own (not outsource): program management/integration, transition strategy, enterprise architecture, accountability. Outsource the program activity and perform the system integration with a combination of FAA and industry.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	**Phase II interviews**	**Focus Groups**	**Colloquia**
Communicating NextGen to the Workforce	The agency has moved forward in communicating NextGen to its employees and is accelerating key NextGen programs. These efforts have made it easier for employees and stakeholders to better understand and envision NextGen.	FAA seems to be frightened to fully communicate the NextGen vision. Even people in high circles within government and industry cannot clearly articulate what FAA is. Maybe FAA's inability to effectively communicate NextGen is attributable to the lack of a business plan.	There seems to be a great deal of buzz about the NextGen program but, few specifics. It would be helpful if there was an online resource that would present all the up to date details of the program. This online site could be updated as the project matured.	There is a lack of confidence in the industry, FAA, Congress, public that NextGen is possible under the current leadership at FAA (career leadership). FAA must identify to the PUBLIC what its goals are for the next year, two years, five years, ten years and hold itself accountable. FAA should identify a NextGen report that is updated monthly or quarterly on these goals and posted on their web page. Without a public report card, this general belief that NextGen is stalled will not be altered.
		They [ATO] are operating in a state that seems to assume that they don't really know what NextGen is. At this rate they will not know until it hits them on the head.	Designated individuals to remain involved throughout the planning stages and brief the remainder of the organization of progress made.	FAA senior leadership does not communicate that they "believe" in NextGen. They believe in a "future" but there no commitment to the NextGen that so far has been defined.
		It is essential that ATO take the leadership role in communicating NextGen. Part of getting buy-in from stakeholders is based on operational improvements to the system as well as improvements to the reliability and safety of the system. This	Impart a clear, concise understanding of how we support progress toward this goal	Aggressively support an honest, objective and operational performance oriented PR effort.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		means that the communication strategy has to be ongoing and always seek to demonstrate the safety and reliability benefits of NextGen.		
		I don't believe that a lot of people understand the NextGen vision. The concept sounds great until you begin to ask yourself: "What does it mean and how do we get there?" Translating the vision into personnel development needs requires an understanding of the National Airspace System (NAS). There hasn't been enough air traffic control involvement in developing the vision into a more detailed understanding of NextGen means. The NextGen concept, vision, and technical requirements have to be fleshed out in a way that is achievable. My personal opinion is that within NextGen there are a lot of platitudes, but little detailed concepts.	Need broader communication of the vision and the implementation planning.	Need to clearly explain the objective of the program to all employees and show them how they will fit in.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
Testing and Evaluation		With regard to NextGen—he explained that FAA should focus on requirements for an adaptive system (not a stable system). Architecture and testing & evaluation should also be adaptive (for both software and systems). Traditional program management will not be sufficient for NextGen. FAA governance needs to be structured to support this. Managers should work to reduce risk versus managing to cost and schedule. The future of work will need risk based management	Prior to 9/11, the technical center was primarily a "Test" facility. Many systems were cancelled in the wake of 9/11 and we have become more of a "Systems Engineering and Acquisition Strategy", primarily because entered more of a planning mode and not many systems were being fielded. ERAM, ADS-B, SWIM, DATACOMM and the rest of the NEXTGEN portfolio will be entering test phases in rapid succession.	Clearly articulate, support, and lead the effort for appropriate, continuous, funding for R&D
Testing and Evaluation (cont'd)		versus requirements based. There are incremental commitment models available—it is tough to manage with FAR regulations—but it can be done.	A successful handoff of one project from the system engineering bin and forward it over to the test & evaluation bin. One project must a guinea pig to see what has/ has not happened (planned) into the transitional phase before NEXTGEN arrives.	Funding for R & D for NextGen (not just at FAA) needs to be addressed. FAA not had a problem in getting funding; NASA is no longer funded for FAA R&D. This is a national issue.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
			We need additional people assigned to NEXTGEN test programs so that we can appropriately support existing test programs while planning and preparing for NEXTGEN testing.	Even if the technology is developed— it is the operational workforce who implement it. If employees don't understand the technology they will not use it. You can't just hand over the software— you have to show them how their life becomes better through use of this new technology.
Staffing	While the ATO is a unique organization, very different from government agencies. Its recruiting nonetheless is performed by the FAA-wide HR office—an organization entrenched in government protocol. This tends to hinder ATO and may even stifle creativity and flexibility to explore. The solution may either be for ATO to get its own recruiting office or for the FAA-wide HR office to have different approaches for hiring ATO personnel.	FAA has an advantage in the federal service in that it has a lot of flexibility in hiring. Yet, they are not very good at exploiting these opportunities to the full extent.	Continue to evaluate and act on staffing needs.	The FAA needs to first transform its workforce. This requires bringing in new talent in areas of systems engineering and integration and some deeper technical domain knowledge. It also needs to refresh its capabilities in program management and project management. It is too difficult for people whose career is fully vested in the current system to leave old ways and plot a new direction. This being said, the mistakes of the past must be avoided. Wise, experienced advisors must be engaged to shepherd new staff along the path. This will require a delicate balance.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		The various business units tend to "rob from each other", a practice which often hinders the recruitment of new talent into the organization. He concluded that the problem of hiring bright talent is especially important in the area of program managers, where the agency lacks "top notch" expertise.	Hire more people!	Provide training and develop opportunities to allow existing employees to ready themselves to support NextGen.
Staffing (cont'd)			Hire competent technical personnel versus many, many support staff hires in ATO-P.	Need a high-energy motivated work force Non-performance must be dealt with in a straight forward manner.
Roles and Responsibility Definition		JPDO is ineffective because it is a joke. ATO and JPDO cannot seem to define their relationship; ATO thinks it is in charge and JPDO is just a window dressing to make it seem like other stakeholders are being involved.	Need to better establish the roles and responsibilities of system engineering across and among the implementing organizations in the ATO.	Given this is mission critical, I have become convinced the owning organization (FAA) cannot outsource the program integration responsibilities and have success (learned lesson from IRS). Defining the roles and responsibilities model is key. This is not to say that all integration activities must be performed internally, but you must have a team in place that can understand the whole system and what role contractors will play in integration activities. Leaders must understand this and be in alignment.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		The first issue is that the work of the JPDO is stalled. They are stuck in the planning phase. The program managers are not allowed to be program managers—and they don't want to take on JPDO. FAA doesn't know how to fix that.	Bring in all the stakeholders and define the roles and responsibilities....it's not just FAA...but all the other fed agencies (DOD, NASA, Commerce....) plus industry and airlines....not only has NextGen not been well defined, the roles and responsibilities are not clear. How does the JPDO (Joint Planning and Development Office fit in?)....then what about the industry, alphabet groups, academia ....seems like we need a national plan of NextGen which defines the concept and the roles of each of the major organizations...without shared commitment and ownership it will not happen..	There has to be a defined "in-charge" organization/individual outside NASA/FAA to make it happen.
			More coordination needed among similar activities.	Someone needs to be in CHARGE. This will never get done by Committee.
Contracting			Contracting Officer needs to be dedicated and integrated into specific team. Needs to have early involvement in order to	We must use lessons learned to define a new type of integration contractor and contract vehicle.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
			understand program objectives and plans.	
			Need to establish support for Contracting Officer. **Establish a** team...Contracting Officer, Contract Specialist and appropriate support personnel.	Too much reliance on contractors—need the right **internal talent and leadership to** drive this. In partnership with contractor community there would be employees within FAA who would understand architecture from soup to nuts.
			Possibility of teaming Contracting Officers together when multiple vendors are involved and need to be integrated into the program.	
			Requires leadership - contracting family has been a follower, not a leader	
			Contracting is overly cautious because of the oversight. Success on NEXTGEN requires a strong plan, defined requirements and strong acquisition strategy.	

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
			Contracting needs to be a strategic partner not a follower. Yes, in the planning side. We are spending time reacting to IG and other oversight now. You need to be a key player on the requirements determination to determine the contracting strategy. Need to educate people on the types of contract we can use.	
Management	The difficult part of NextGen is perhaps organizing the evolution of the system in a logical and seamless manner.		Need more management attention [on NextGen] - on a continuing, consistent basis.	
Metrics		When you look at the big picture— there is not great use of metrics in ATO. There are a lot of metrics in place for operations—but not for program and financial managers. Somehow the use of metrics has not flowed down to the rest of the organization. FAA needs to have metrics for NextGen and they should be listed in the performance agreement with the managers.		Insure the FAA support and operational staff are engaged in defining measurable benefits, and communicate progress and problems candidly to this team as the program progresses.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
		FAA does not have that ability to track things once programs become operational.		Need key measurable metrics that everyone can understand and rally around.
		If the people are working with real metrics then you have a good chance of using that to make a management tool.		Important to have interim metrics [for NextGen] not just for 2025 and have deliverables that are specific/defined. IRS has them.
Culture	Perhaps ATO should take a different approach to managing air traffic. For example, rather than using a "first-in, first-out" approach to carriers as a standard rule, he suggested that maybe preference should be given to certain types of aircraft under certain conditions.	Left alone, the FAA would naturally lean towards improving the current system rather than replacing it altogether. They would improve the ground-based approach and add more air traffic controllers. Given the commitment to NextGen then, the biggest challenge, is how to get out of that mindset and work towards one focused on making the future system a reality.		I believe that the trust issues surrounding the introduction of new technologies into the FAA system is one that will be a killer unless resolved by a commitment to win over the users and stakeholders through realistic demonstrations of the new technologies and the improvements through simulations—hardware in the loop and software in the loop. Users need to be engaged in these environments to elicit and then get buy-in on requirements up-front. Otherwise, the changing requirements and lack of buy-in will drive cost through the roof and the program will flounder and fail.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
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		FAA managers are incredibly risk averse. This has led to the inability to articulate where they are headed, to stay ahead of curve, or push the organizational envelope (get their program to move ahead). How do you legislate better management? How does Congress make this happen if you can't get new people in-house and the community cannot embrace the solution?		Need to start working the culture change required early in the process and get people to start looking at the big picture. Laying the groundwork for culture change will play a big role in enabling Next Gen within the operational workforce.
Culture (cont'd)				FAA has a very tough problem to solve in how to change the culture to one that will accept new technology. New technology is messy in the development stage and demanding 100% perfection on day one will delay implementation so long as to kill the programs. I believe a solution can be found in changing the culture to one that embodies more of a continuous improvement approach. The continuous improvement approach needs to be implemented across the board in everything that they do. Six Sigma comes to mind as one that could work very well within the FAA.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
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				FAA makes it clear by its actions and rewards system that it places a much higher priority on "day to day" operations and achievement then it does on either "planning" or "new technology". People understand this clearly. FAA must establish a rewards system that values NextGen achievement at all levels.....not just for a small group of engineering planners.
				The sole authority and responsibility to transform an operational system cannot rest in the organization responsible for operations of that system. I believe this to be a universal truth. The FAA needs stakeholder help and congressional support to segregate its critical responsibility to implement and manage the current NAS from the responsibility to transform today's NAS to NextGen.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
	VP roundtable	Phase II interviews	Focus Groups	Colloquia
Culture (cont'd)				We must be very clear that the current FA A is a 24 x 7 operational agency/bureaucracy designed to perform air traffic control as it's primary and dominant mission, and not air traffic management. NextGen is an air traffic management system, and therefore not well suited to the FA A organization and culture. The FA A has 3 cultures: TERMINAL, EN ROUTE AND TRAFFIC FLOW MANAGEMENT The first 2 are dominant and the third is not. In the future we will not remove the TERMINAL (750 TRACONS) OPERATION and it will be a part of NextGen. The EN ROUTE operation (21 centers around the US will have to be phased out over the next 20 years, a daunting challenge for the FA A culture and union. The TRAFFIC FLOW MANAGEMENT system will become a dominant culture and the FA A is currently building the TFMM system, which should be to foundation system for NextGen air traffic management.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
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				The current culture is to 'shoot the messenger' .
				Command and control function (controllers) are now changing to systems management (traffic managers). This is a different culture and requires a different type of person. Challenge is to hire someone today to do tomorrow's job— and transition them over.
Business Case/Strategic Planning		FAA has historically had a problem with effectively planning and implementing programs. They have been known to acquire things and later figure out that they don't need them – that is obviously a waste of money, time and other resources. This pattern has made Congress less than confident in the agency and has called for more discipline within the FAA. In this regard, the fact that we require business cases for organizations to justify the cost of something is a good helpful process to keep from making a mistake.		There has to be a mechanism for accountability within the FAA and a related process of funding to allow the management of NG in a more business like way.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
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		FAA needs a more rigorous process of justifying programs through the business case model. This should ensure that all decisions are not just filtered up through the organization's leadership chain, but also down to the supervisors and other associates. That will help with the decision-making process. FAA does strategic planning as an exercise and not as a business tool. I think they see it as an unnecessary impediment. As a result, some of their strategic goals and decisions are so broad and general that they are practically unusable. A better strategic planning process would certainly improve decision-making.		No clear path to success—we are changing the tires on the race car as it goes around the track.
Business Case/Strategic Planning (cont'd)	ATO has not focused adequately on strategic communication of NextGen. Instead, the organization has focused on the "nuts and bolts", meaning the technical aspects of NextGen rather than the broader strategic idea of the future system.	It is not enough for the agency to have a good business case, more importantly it should take real life situations into consideration and be practical about expected benefits. If the people are working with real metrics then you have a good chance of using that to make a management tool.		

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
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		There are certain key challenges within FAA, particularly in the area of business case development. Since the new restructuring of the past seven years, the agency has looked at getting a robust business development approach.		
Budgeting for NextGen		Another of the challenges with budgeting for NextGen is the fact that none of the current estimates are necessarily accurate; that is not a function of incompetence, but rather of the fact that it is difficult to really know how much something will cost, when its acquisition is so far out in the future. The estimates are not set in stone, and everyone understands that they will change as the development of NextGen evolves.		
		Sometimes budget decisions are based on the fear of losing funding. So for instance, program managers will seek funding for programs that they can easily justify rather than for others that might be more important, but also more		

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
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		difficult to justify. Since they don't want to lose the funding, they make the tradeoff. They are also victims of associating programs with NextGen just so that they can get more money or any money at all.		
Budgeting for NextGen (cont'd)		The appropriation process presents a challenge for the agency because of the unevenness of its cycle, which further complicates planning for NextGen. The annual cycle also creates somewhat of an impediment – not just for FAA, but for other federal agencies that have to fit their planning process in this cycle.		
Champion for NextGen at National Level				NextGen needs to find a high-level champion. It needs to be a plank in the political platform of the next President. It needs to get on the national radar screen.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
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				The next administration must create a national program with a national Program Management Office (PMO) or Special Projects Office (SPO). The office must not be in the FA A and should report to the DOT secretary with full authority and budget the design and build NextGen. We also must have a national Transportation Modernization Act passed by the Senate. The act (like the IRS Modernization Act) would come with a $3B/year checkbook fore 20 years, and the set of criteria to have GAO and OMB allocation the funds when the act's provisions are being met and only then. The PMO would establish a management and governing structure and the schedule, management and technical baselines with well defined deliverables phased in over time. We can do some modeling and simulation (FA A, VOLPE, NASA, DOD, DHS, DOC), but the current "Paralysis by Analysis" must stop, and the engineering and design begin.

4. ORGANIZATIONAL ISSUES				
	Specific Comments			
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Champion for NextGen at National Level (cont'd)				The Administration must make Aviation System Modernization a national priority on the scale of "energy conservation," the NASA Apollo Program, or "global warming." There are core political issues that must have strong Administration support is NextGen has any hope of succeeding—i.e., Facility Consolidation
				This needs to be a National Funded Program with funding fenced off for NextGen
				This is a national economic issue—[without fixes] we will lose trillions a year