United States Government Accountability Office

Report to Congressional Requesters

October 2016

AIR TRAFFIC CONTROL

Experts' and Stakeholders' Views on Key Issues to Consider in a Potential Restructuring

The electronic version of this report was reposted December 9, 2016 to make the following corrections.

(1) Revised percent of revenues to correct p. 45 second line. The corrected sentence should read: "According to a report by the UK National Audit Office, UK NATS was vulnerable to adverse events such as the decline in the level of transatlantic traffic, which accounted for 43 percent of its revenues, even though it represented only 14 percent of all flights."

(2) Revised List of Experts affiliation for James Straker-Nesbit on p. 49. Affiliation should read: "Lloyd's Market Association".

GAO-17-131

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GAO Highlights

Highlights of GAO-17-131, a report to congressional requesters

Why GAO Did This Study

Since 1987, several countries have changed the management and funding of ATC services. Over the past two decades, U.S. aviation stakeholders, including an administration and Congress, have debated whether the FAA should continue to operate and modernize the country's ATC system or whether an independent, self-financed organization—either public or private—should take on this role. In 2014, GAO found (1) that many aviation stakeholders saw challenges with aspects of the current U.S. system including funding instability and slow progress implementing capital improvements and (2) that most stakeholders agreed that separating ATC operations from FAA was an option. GAO was asked to explore issues that would be associated with such a change.

This report addresses (1) views of selected experts, aviation stakeholders, and the FAA on key transition issues and (2) lessons that can be learned from the transition experiences of selected countries.

GAO reviewed literature including previous GAO reports; worked with the National Academy to judgmentally select 32 experts from academia, think tanks, finance, the transportation industry and other related backgrounds, and interviewed and surveyed them; judgmentally selected and interviewed 20 aviation industry stakeholders to obtain a range of perspectives; and spoke with FAA. GAO reviewed documents related to U.K.'s, Canada's, and New Zealand's ATC transitions and interviewed current and former officials and stakeholders involved in those transitions.

View GAO-17-131. For more information, contact Gerald Dillingham, Ph.D., dillinghamg@gao.gov 202-512-2834

What GAO Found

Experts, aviation stakeholders, and Federal Aviation Administration (FAA) officials GAO spoke to said that if Congress decides to remove air traffic control (ATC) from the FAA, many issues should be considered. Key issues identified, consistent with GAO's past work, relate to: (1) organizational management, (2) funding and financing, and (3) transition time and related costs.

First, organizational issues include defining roles, responsibilities, coordination, and ensuring workforce protections. Addressing these issues would affect the potential for success both of the ATC entity and of activities remaining with FAA, including safety oversight. For example, experts indicated that it would be key to morale to maintain existing employee benefits for both employees who remained at FAA and those who moved to a new ATC entity. Second, funding approaches for an ATC entity would depend, in part, on the type of organizational structure chosen, (e.g., public or private ownership), but most experts indicated a user-fee system should be implemented if a change occurred. Experts and aviation stakeholders raised issues associated with a user fee, including how to determine the level of fees and the impact of those fees on certain users, such as general aviation and cargo carriers. Both experts and stakeholders noted that the valuation ATC assets as well as the transfer of and, payment for, ATC assets will also need to be considered as well as responsibility for, and funding of pension and other liabilities. Third, experts estimated that it would take a number of years to appropriately develop legislation, as well as to negotiate, plan, and implement a transition and noted that there would be associated legal, financial, and other costs for such a transition.

GAO identified lessons learned from international experiences including the United Kingdom (UK), Canada, and New Zealand in restructuring their ATC services. Lessons include how these countries mitigated challenges associated with:

1. ensuring coordination and collaboration between the ATC entity and the safety regulator—the New Zealand ATC entity put both formal and informal arrangements in place to ensure strong collaboration between the ATC entity and the regulator when developing new technologies.

2. developing a funding and financing structure—the U.K. and Canada both learned that building in mechanisms to help mitigate financial risks is a key lesson that should be considered during the creation of a user fee system. Specifically, due to the decline in air traffic after September 11, 2001, the U.K.'s ATC entity had to work with the government to refinance and restructure the system, including finding a new investor and relaxing caps on user fees, so the U.K. ATC's could raise fees.

3. establishing an appropriate amount of time to plan and implement a transition—according to a consultant's work on international civil aviation authority's transitions for six countries, it took up to 7 years to complete a transition from government authority to a new entity.

Contents

Abbreviations

A4A	Airlines for America
AAAE	American Association of Airport Executives
ACI-NA	Airports Council International - North America
ADS-B	Automatic Dependent Surveillance-Broadcast
AIA	Aerospace Industries Association
AIP	Airport Improvement Program
ALPA	Airline Pilots Association
AFGE	American Federation of Government Employees
AFSCME	American Federation of State, County, and Municipal Employees
ANSP	air navigation service provider
AOPA	Aircraft Owners and Pilots Association
ATC	air traffic control
ATCA	Air Traffic Control Association
ATO	Air Traffic Organization
AVS	Office of Aviation Safety
CAA	Cargo Airline Association
CEO	chief executive officer
COO	chief operating officer
CANSO	Civil Air Navigation Services Organisation

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSRS	Civil Service Retirement System
EUROCONTROL	European Organisation for the Safety of Air Navigation
FAA	Federal Aviation Administration
FERS	Federal Employee Retirement System
FEGLI	Federal Employees Life Insurance Program
FEHBP	Federal Employees Health Benefits Program
ICAO	International Civil Aviation Organization
GAMA	General Aviation Manufactures Association
HAI	Helicopters Association International
LIUNA	Laborer's International Union of North America
NAGE	National Association of Government Employees
NAS	National Airspace System
NATA	National Air Transportation Association
NATCA	National Air Traffic Controllers Association
NATS	National Air Traffic Services, Ltd.
NBAA	National Business Aviation Association
NEPA	National Environmental Policy Act
NextGen	Next Generation Air Transportation System
NFFE	National Federation of Federal Employees
NTSB	National Transportation Safety Board
OAPM	Optimization of Airspace and Procedures in the Metroplex
PAACE	Professional Association of Aeronautical Center Employees
PASS	Professional Association of Safety Specialists
PBN	Performance Based Navigation
PMO	Program Management Office
RAA	Regional Airline Association
RSA	rate stabilization account
RACCA	Regional Air Cargo Carriers Association
UAS	Unmanned Aerial System
UK	United Kingdom

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October 13, 2016

The Honorable Peter DeFazio
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Rick Larsen
Ranking Member
Subcommittee on Aviation
Committee on Transportation and Infrastructure
House of Representatives

Since 1987, several countries have shifted the responsibility for providing air traffic control (ATC) services from national civil aviation authorities like the Federal Aviation Administration (FAA), to independent, self-financed entities with either public or private ownership. In the United States—which has what is generally considered the busiest, most complex and safest ATC system in the world—FAA is the air navigation service provider (ANSP)—the country's civil aviation authority. The ownership structure of ANSPs in other countries varies from government-owned entities (either wholly-owned or partially-owned government corporations) to privately-owned entities (entities with private ownership and control of an air traffic services corporation). A privately-owned entity can be a "for-profit" or a "non-profit" entity.

Over the past two decades, U.S. aviation stakeholders, including an administration and Congress, have debated whether the FAA should remain the entity that operates and modernizes the ATC system or whether a restructured entity should take on this role. This debate has focused on concerns with certain aspects of the United States' current approach to managing and modernizing the ATC system on which we have reported over the years. Specifically, in 2014, we found that according to stakeholders and FAA officials, the current system faced challenges related to mitigating the effects of an uncertain fiscal environment and modernizing the ATC system, and that these concerns

may be driving the debate on a potential restructuring.[1] Moreover, aviation stakeholders stated that it is important to identify what problem or problems separating ATC services out of FAA is intended to solve before proceeding with such a restructuring as a solution. The majority of stakeholders we spoke with agreed that separating ATC operations from FAA was an option to consider. However, some of these aviation stakeholders believed a change in the ATC system is not necessary and were concerned that such a transition would take resources and focus away from current endeavors such as capital improvement projects in FAA's air traffic control modernization initiative (also known as NextGen). In February 2016, we identified some key issues surrounding a restructuring or separating the air traffic control system based on preliminary views of experts from a variety of issue areas.[2] Also, in February 2016, legislation was introduced to move the ATC operation from FAA into a government-chartered corporation.[3]

Any ATC restructuring would be a difficult, complex, challenging multi-year effort. For our February 2016 report, we interviewed officials involved in some other countries' ATC restructuring, and they told us such a transition was not easy, but that generally the resulting system was a positive change. However, given the key transition issues involved, a restructuring of any kind could be more complicated than in other countries because the U.S. ATC system is bigger and more diverse than any other system in the world. There are many multifaceted, substantial transition issues involved, and views on how a restructuring should be organized vary. You asked us to explore potential transition issues to be addressed if the current U.S. ATC organization were restructured, regardless of the form of the new entity, and to identify lessons learned from other countries experiences in restructuring of their ATC services.

[1] GAO, *Air Traffic Control System: Selected Stakeholders' Perspectives on Operations, Modernization, and Structure*, GAO-14-770 (Washington, D.C.: Sept. 12, 2014).

[2] GAO, *Preliminary Observations of Potential Air Traffic Control Restructuring Transition Issues,* GAO-16-386R (Washington, D.C.: Feb. 10, 2016).

[3] The Aviation Innovation, Reform, and Reauthorization Act of 2016 (H.R. 4441, 114th Cong. (2016) was last reported out from the House Transportation and Infrastructure Committee on February 11, 2016 and as of September 29, 2016, was pending in the House. In July 2016, the FAA Extension, Safety, and Security Act of 2016 (Pub. L. No. 114-190, 130 Stat. 615) was enacted into law. This legislation extended FAA's authorization through September 30, 2017 and did not include ATC separation.

Specifically, we examined (1) views of selected experts, selected aviation stakeholders, and FAA on key transition issues if the U.S. ATC system is moved from FAA to a new entity and (2) what lessons can be learned from the experiences of other selected countries in transitioning responsibility for air traffic control from civil aviation authorities to other organizations.

We initially identified key transition issues associated with a potential restructuring of the U.S. ATC system primarily through reviewing available literature on restructuring of ATC organizations and prior GAO work, including work on organizational mergers and transformations;[4] obtaining the input of GAO subject matter experts; and conducting exploratory interviews with academics, professionals in the U.S. aviation industry, and officials involved in transitions in other countries.[5] (For a list of selected prior related work in this area, see the Related GAO Products page at the end of this report). To obtain the views of selected experts on key transition issues, we collaborated with the National Academy of Sciences (National Academies) to identify and recruit experts with a range of expertise who could speak to these ATC transition issues. We provided the National Academies with criteria for selecting experts, which included: (1) type and depth of experience, including the expert's recognition in the professional community and relevance of any published work; (2) present and past employment history and professional affiliations, as well as any potential conflicts of interest; and (3) other experts' recommendations.[6] Based on the National Academy's recommendations and our review of literature on ATC reform and related GAO reports, we judgmentally selected 32 experts with a range of expertise that can speak to these ATC transition issues. We interviewed these experts between November 2015 and February 2016, and asked the experts to complete a follow-up web-based survey accessible through

[4] GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*.GAO-03-669 (Washington, D.C.: July 23, 2003) and Managing for Results: Key Considerations for Implementing Interagency Collaborative Mechanisms,GAO-12-1022 (Washington, D.C.: Sept. 27, 2012).

[5] We judgmentally selected academics and professionals to interview based on their expertise of ATC transition issues and published studies on the topic.

[6] These were based on recommendations that came up during our initial exploratory interviews with academics and professionals in the U.S. aviation industry.

a secure server, which allowed for more quantification of the expert's collective views. These survey results can be found in appendix II. For the survey we directed the experts to respond only to questions about areas in which they had specific knowledge or expertise. As a result, throughout our report, the number of expert responses to survey questions discussed is smaller than 32, the total number of experts we interviewed.

In addition, to obtain the views of selected aviation stakeholders on key transition issues, we judgmentally selected and interviewed 20 aviation stakeholders representing a range of perspectives including airlines, airports, cargo, general and business aviation, labor unions, aircraft manufacturers, and other aviation professionals and knowledgeable persons, to gather their views on potential ATC transition issues. We wanted to obtain perspectives from individuals and organizations with direct experience as users of the current ATC system or knowledge through research or study of this system, modernization efforts, and FAA's management of the system. Because we judgmentally selected experts and aviation stakeholders to speak to, information from these interviews is non-generalizable. To obtain information from FAA officials on key transition issues, we spoke to officials about the transition issues we identified as well as any additional issues they considered relevant to a transition and obtained relevant documentation. We also obtained information from the Department of Defense (DOD) on issues DOD would consider relevant to a transition.

To obtain any potential lessons learned from the experience of transitioning an existing government ATC to an ANSP, we spoke to current and former officials and stakeholders involved in transitions in Canada, the United Kingdom (UK), and New Zealand[7] and reviewed literature that examined these transitions. We selected these countries to include a mix of different types of governance structures (e.g., private, governmental, public-private partnerships, etc.), countries that have been cited frequently as a model for the U.S. in literature, the availability of information about transitions including prior reporting by GAO and others.. Because we judgmentally selected these countries our results are non-

[7] Since New Zealand restructured its ATC system in 1987, we were only able to interview one official who had experience with the change. In addition to the interview we relied on documentation of the restructuring.

generalizable. (See app.I for a more detailed description of our scope and methodology.)

We conducted this performance audit from June 2015 to October 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

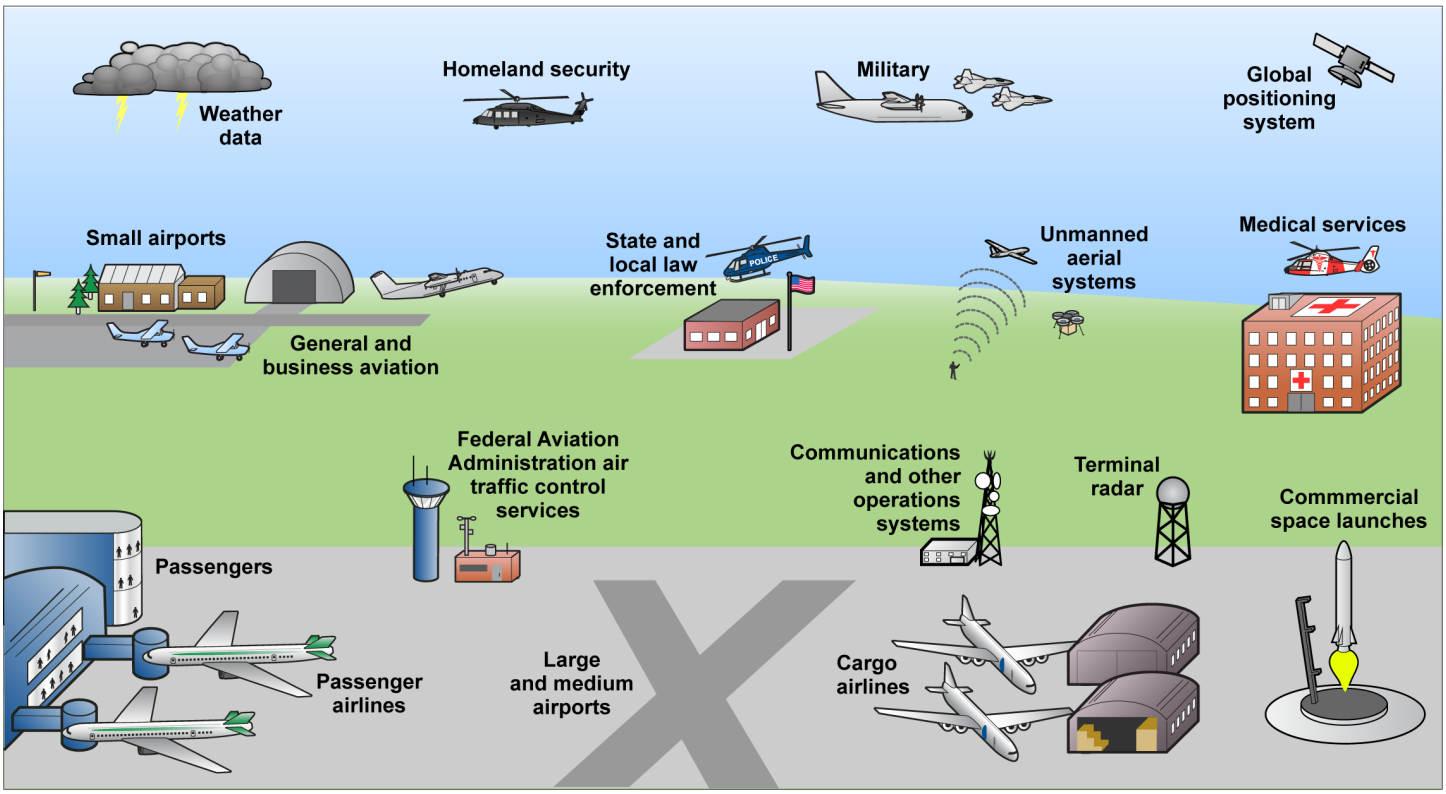
Background

U. S. National Air Space and Its Users

The FAA operates and maintains the U.S. national airspace system (NAS) which includes what is generally considered not only the busiest—handling over 50,000 flights per day—more than 700 million passengers each year—and the most complex air traffic control system in the world, but also the safest. In addition to commercial aviation and its passengers, other users—such as, airports, general, business, and public-use aviation (e.g., government users like DOD, Department of Homeland Security, law enforcement and border patrol), as well new entrants such as commercial space companies and unmanned aerial systems (UAS) also known as drones—have access to the national airspace. (See fig. 1).[8]

[8] The United States has more than 19,000 airports, ranging from busy commercial service airports such as the Hartsfield-Jackson Atlanta International Airport that enplanes millions of passengers annually to small grass airstrips that serve only a few aircraft each year. Most U.S. airports are publicly owned, and funding comes from five main sources: airport-generated net income, federal Airport Improvement Program grants, Passenger Facility Charges, capital contributions, and state grants. GAO, *Airport Finance: Information on Funding Sources and Planned Capital Development,* GAO-15-306 (Washington, D.C., April 28, 2015).

Figure 1: An Illustration of Key Components and Users of the United States' National Air Space



Source: GAO. | GAO-17-131

FAA Funding Structure

Congress appropriates funding from the Airport and Airway Trust Fund (Trust Fund) as well as general revenues.[9] Trust Fund revenues come from a set of excise taxes paid by users of the national airspace system, such as taxes levied on passenger tickets and commercial fuel.[10] These funds support air traffic operations, facilities and equipment, research engineering and development, and grants in aid for airports. For example,

[9] Funds are made available from the Trust Fund through the appropriations process.

[10] GAO, Airport and Airway Trust Fund: *Factors Affecting Revenue Forecast Accuracy and Realizing Future FAA Expenditures*, GAO-12-222 (Washington, D.C.: Jan. 23, 2012).

in fiscal year 2015 FAA's funding was over $15 billion; $14.6 billion came from Trust Fund Revenue.[11]

FAA's ATC Assets, Staff, and Employee-Related Financial Obligations

- Assets: FAA is responsible for operating and maintaining the air traffic control and supporting system and infrastructure, which includes air traffic control centers and towers,[12] ground-based surveillance radars, communication equipment, automation systems, and facilities that house and support these systems. We reported in 2013 that this infrastructure totaled 66,570 facilities, systems, and unstaffed infrastructure assets and that the data on how FAA determines the condition of these facilities could be improved.[13]
- Workforce: In fiscal year 2015, FAA had a workforce of about 40,000 employees including approximately 14,500 air traffic controllers, 5,000 air traffic supervisors and managers, 7,800 engineers and maintenance technicians, and over 7,000 FAA safety staff. FAA employees are represented by various labor unions including the National Air Traffic Controllers Association—the labor union representing FAA's air traffic controllers—and the Professional Aviation Safety Specialists and American Federation of Labor and Congress of Industrial Organizations, which represent FAA inspectors and FAA employees who maintain air traffic control equipment. FAA controllers and technicians are entitled to engage in collective bargaining,[14] but prohibited by federal statute from participating in a

[11] According to FAA, the dollar amount and percentage of annual funding from the Trust Fund varies from year to year.

[12] This refers to staffed en-route traffic control centers, terminal approach control, and towers.

[13] GAO, National Airspace System: *Improved Budgeting Could Help FAA Better Determine Future Operations and Maintenance Priorities*, GAO-13-693 (Washington, D.C.: Aug. 22, 2013) and GAO, FAA Facilities: *Improved Condition Assessment Methods Could Better Inform Maintenance Decisions and Capital- Planning Efforts* GAO-13-757 (Washington, D.C.: Sept. 10, 2013). This report recommended FAA improve the precision of the estimation methods to determine conditions at its ATC facilities and develop and implement a plan to assess and improve data, to ensure that the data are sufficiently complete, and accurate. As of September 2016, FAA has not implemented these recommendations.

[14] See, 49 U.S.C. § 40122(g)(2)(C), and 5 U.S.C. § 7102.

strike.[15] In addition, under federal statute, it is an unfair labor practice for a labor organization to call or participate in a strike or work stoppage, or slowdown or picketing if such picketing interferes with an agency's operations.[16]

- Pensions and other retirement benefits: Pensions for civilian federal employees generally are provided through two programs, the Civil Service Retirement System (CSRS) or the Federal Employee Retirement System (FERS), depending upon when the employees were hired. Generally, employees hired before 1984 are covered by CSRS, while employees hired in or after 1984 are covered by FERS.[17] Retiree health insurance benefits and retiree life insurance benefits for civilian federal employees generally are available through the Federal Employees Health Benefits Program (FEHBP) and the Federal Employees Life Insurance Program (FEGLI), respectively. All of these retirement programs require actuarial estimates to determine annual costs and accrued liabilities.[18] The Office of Personnel Management (OPM) actuaries determine these costs and liabilities. According to FAA, the agency recognizes the cost of pensions and other retirement benefits during an employee's active years of service.[19] OPM recognizes the federal government's liability for these benefits and pays such benefits after someone retires. However, OPM does not calculate the liability related to a particular agency.[20] Consequently, FAA does not know what the amount is of its unfunded liability, if any, associated with employee retirement plans and does

[15] See, 49 U.S.C. § 40122(g)(2)(C), and 5 U.S.C. § 7311.

[16] 5 U.S.C. § 7116(b)(7).

[17] Federal employee pension plans are governed by Title 5 of the U.S. Code. Private sector employers and unions sponsoring pension plans generally must comply with the Employee Retirement Income Security Act (ERISA) of 1974. ERISA sets standards that private sector plans must meet with respect to reporting and disclosure, employee participation and vesting, plan funding, and fiduciary standards.

[18] Annual costs generally represent estimates of the actuarial present value of retirement benefits to be paid in the future that are deemed to be earned by current employees in a particular year. Liabilities, also called accrued liabilities, generally represent estimates of the actuarial present value of retirement benefits to be paid in the future that are deemed to be attributable to service rendered in the past by current employees and retirees.

[19] Some of these costs are paid directly by FAA, while others are "imputed."

[20] With the exception of the United States Postal Service.

not report plan assets, accrued liabilities, or unfunded liabilities applicable to its employees and retirees.

FAA Offices Involved with ATC System

Various offices within the FAA are responsible for operating and managing all aspects of the ATC system, regulating safety, implementing modernization efforts, and conducting research and development activities that may be affected in a transition.

- ATC operations and management: The FAA Air Traffic Organization (ATO) operates and maintains the ATC system through the FAA workforce that includes approximately 6,000 technicians and 14,500 air traffic controllers who work in airport towers, terminal areas, en-route centers, oceanic ATC centers, and other supporting systems and infrastructure.
- Safety and regulatory functions: Several offices within FAA perform safety and regulatory functions. For example, the Office of Aviation Safety (AVS) and two offices within it—the Aircraft Certification Service and Flight Standards Service offices—issue certificates for new air operators, new aircraft, and aircraft parts and equipment, and grant approvals for such things as changes to air operations and aircraft, based on federal aviation regulations.[21] The Unmanned Aerial Systems Integration Office[22] is responsible for ensuring that unmanned aerial systems (UAS), commonly referred to as drones, are integrated into and operate safely in the national airspace system.[23]
- ATC modernization and capital investment efforts: A number of offices within FAA are involved in the management and implementation of modernization and capital investment efforts, including ATO, AVS, and the NextGen office, which is responsible for implementing

[21] FAA inspectors and engineers interpret and implement these regulations governing certificates and approvals through FAA policies and guidance, including orders, notices, and advisory circulars.

[22] See GAO, *Unmanned Aerial Systems: FAA Continues Progress toward Integration into the National Airspace*, GAO-15-610 (Washington, D.C.: July 16, 2015).

[23] This office consolidates Aviation Safety and ATO personnel with UAS expertise into a single organization.

NextGen—a complex, long-term initiative to modernize the ATC system.[24]

- Research, development, and training: FAA funds research and development centers, such as the Mike Monroney Aeronautical Center and the William J. Hughes Technical Center, which support aviation research, development, testing, and training and evaluation of ATC and aircraft safety, among other aviation areas.

In addition, the following offices, Commercial Space Transportation, Airports, Security and Hazardous Materials and Policy, International Affairs, and Environment also regularly interact and coordinate with ATO on a variety cross cutting issues.

Capital Improvements in the Air Traffic Control System

NextGen is a multiyear, incremental program planned to incorporate precision satellite navigation and surveillance, digital, networked-communications, and an integrated weather system.[25] This complex undertaking involves acquiring new integrated air traffic control systems; developing new flight procedures, standards, and regulations; and creating and maintaining new supporting infrastructure. This transformation is designed to dramatically change the roles and responsibilities of both air traffic controllers and pilots and change the way they interact with their systems. The involvement of airlines and other aviation stakeholders is also essential, since full implementation of NextGen will require airlines and others to invest in new avionics and other technologies to take full advantage of NextGen benefits.[26]

Air Navigation Service Providers in Other Countries

Other countries' ANSPs vary in the extent of government ownership and commercialization, with some structured as government-owned corporations, some as public-private partnerships, and some as private corporations. Regardless of the type of ownership structure, the three international ANSPs that we reviewed in this study perform the nation's air traffic control operations, employ the air traffic control workforce,

[24] GAO, *Air Traffic Control: Selected Stakeholders' Perspectives on Operations, Modernization, and Structure*, GAO-14-770 (Washington, D.C.: Sept 12, 2014).

[25] Congress directed FAA in 2003 to conceptualize and plan NextGen.

[26] GAO-14-770.

maintain the air traffic control infrastructure, and undertake modernization efforts (see table 1).[27]

Table 1: Selected Characteristics of Selected Air Navigation Service Providers and the Federal Aviation Administration

	Airways New Zealand	United Kingdom - NATS	NAV CANADA	FAA -USA
Year of turnover	1987	2001	1996	N/A
Ownership	State-owned	Public-private	Private	Federal government
Annual Commercial Flights	1,000,000	2,340,000	12,000,000	25,100,000
Controllers	350	1,636	2,000	15,000
Staffed Facilities	27	40	200	538
Controlled airspace	30 million square kilometers	29.1 million square kilometers	18.8 million square miles	75.1 million square kilometers

Sources: GAO analysis of air traffic control transformation literature | GAO-17-131

Selected Experts, Aviation Stakeholders, and FAA Officials Identified Various Key Issues in a Potential Transition

Experts, aviation stakeholders, and FAA officials that we spoke to identified many issues that will need to be considered if a transition were to occur.[28] Key issues include: (1) organizational management and workforce issues, (2) funding and financing, and (3) time and costs to transition. They told us these issues would need to be considered to help ensure that between the FAA and a new ATC entity there was efficient management of the NAS, maintenance of the current level of safety, ongoing modernization of the ATC system, and stable funding.

[27] See GAO, *Air Traffic Control: Characteristics and Performance of Selected International Air Navigation Service Providers and Lessons Learned from Their Commercialization*, GAO-05-769 (Washington, D.C.: July 29, 2005).

[28] Our survey was broken into sections; only experts with relevant expertise received a particular survey section to complete. See Appendix II for complete survey results.

Organizational Management and Work Force Issues to be Considered in any ATC Transition

Selected experts and stakeholders as well as FAA officials indicated that if a transition were to occur, it would be important to ensure time is taken and efforts made to set up the new ATC entity and reorganize the safety regulatory entity to support their organizational objectives, including maintaining safety and continuing the ATC system modernization. Issues the experts, stakeholders, and officials identified that would need to be considered, many of which align with our past reports about organizational transformations and collaboration,[29] would include what activities each entity would be responsible for, as well as the coordination and collaboration between and within the organizations as well as their cultures. Decisions regarding these issues could impact one or both of the organizations and their effectiveness in achieving their objectives.

Organization Management Is a Key Issue of Any ATC Transition

Organizational management is important to enabling an organization to achieve its objectives. Our selected experts and those we spoke with when conducting our international case studies mentioned the importance of delineating each organization's roles and responsibilities, if reorganization were to occur. In addition to setting up organizational structures, experts indicated that the impact of a reorganization on collaboration and communication among the two entities as well as with the industry were important considerations. We have previously found that for collaboration to succeed, organizations must take key steps such as clarifying roles and responsibilities.[30] Experts, aviation stakeholders, and FAA officials we spoke to also commented on what they thought of the difficulty, time involved, and potential impact of these steps on objectives they thought were important, including safety and NextGen.

Delineating Roles and Responsibilities

Experts we spoke to and literature we reviewed about international ANSP transitions indicated that delineating roles and responsibilities between the two organizations that would result from an ATC restructure would be important. We previously found that establishing clearly defined roles and responsibilities has a number of benefits including assigning

[29] See GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformation,* GAO-03-669 (Washington, D.C.: July 2, 2003) and *Managing for Results: Key Considerations for Implementing Interagency Collaborative Mechanisms,* GAO-12-1022 (Washington, D.C.: Sept. 27, 2012).

[30] See GAO-12-1022.

accountability.[31] While an important issue, experts were split on how difficult it would be to determine which existing FAA offices, roles, and responsibilities should remain with the safety regulator (FAA) and which should be transferred to a new ATC entity. For example, about half of the experts that responded to this portion of our survey (6 of 13)[32] responded that it would be very or moderately difficult, while another 6 of 13 experts responded that it would be very or moderately easy.[33]

Some experts we interviewed stated that it may be easier to identify some current FAA functions that should clearly remain with the safety regulator, such as medical certifications and safety regulations, than to determine the appropriate entity to perform other functions. When surveyed about what current FAA activities should remain the responsibility of the safety regulator:

- 13 of 13 experts responded that aviation safety oversight and regulatory functions, such as developing safety performance standards and certifying aircraft, should remain the responsibility of the safety regulator.
- 11 of 13 experts responded that activities such as issuing pilot medical certificates should remain the responsibility of the safety regulator.
- 10 of 13 experts responded that commercial space activities should remain the responsibility of the safety regulator.

[31] See GAO-12-1022.

[32] We received survey responses from 13 of 14 experts that received this portion of our survey.

[33] One expert responded it would neither easy nor difficult.

- 10 of 13 experts responded that accident investigations not conducted by the National Transportation Safety Board[34] should remain the responsibility of the safety regulator.

However, experts were less in alignment on which organization should be responsible for other functions, for example:

- Two of 13 experts responded that developing flight standards, such as new performance-based navigation procedures,[35] should be the responsibility of the safety regulator.
- Five of 13 experts responded it should be the responsibility of the new ATC entity.
- Six of 13 experts responded it should be the responsibility of both organizations.

One expert we interviewed explained that developing and approving flight standards[36] currently spans FAA's ATC operations and safety organizations, and thus, it would be difficult to determine how to separate this activity between the safety regulator and ATC entity since both entities would need to be involved in this function.

Another issue is which organization should be responsible for the global harmonization of NextGen activities, including working with international stakeholders. Over half the experts (8 of 13) responded that global harmonization should be the responsibility of both the safety regulator

[34] The National Transportation Safety Board (NTSB) is responsible for conducting accident investigations involving any civil aircraft. NTSB can delegate investigations to the FAA. We found that NTSB conducts on-scene investigations of major accidents and more limited investigations of accidents not designated as major. NTSB defines a major accident as one that involves an issue that is related to a current safety study or special investigation, affects public confidence or transportation safety in a significant way, or is catastrophic. GAO, *National Transportation Safety Board: Issues Related to the 2010 Reauthorization*, GAO-10-366T (Washington, D.C.: Jan. 27, 2010)

[35] Performance-based navigation procures are intended to deliver new routes and procedures that primarily use satellite-based navigation and on-board aircraft equipment to navigate with greater precision and accuracy through all phases of flight which an enabling technology for NextGen.

[36] According to FAA information, Flight Standards Service promotes safe air transportation by setting the standards for certification and oversight of airmen, air operators, air agencies, and designees.

and the ATC entity. In addition to functional areas, there are management and administrative functions such as human resource and finance offices within FAA that might have to be separated or eliminated, and according to another expert, that could be a challenge.

According to FAA officials, experiences in other countries suggest that clearly delineating and documenting roles and responsibilities would be needed to respond to and manage different operational and emergency scenarios. Specifically, FAA stated that delineating and documenting roles and responsibilities as well as policies and procedures, including provisions for a continuing shared responsibility where applicable, would need to be codified into Federal Aviation Regulations.[37] For example, current FAA Orders and directives concerning the air navigation services provided by a separate ATC entity would have to be reviewed and those functions which would transfer to the new ATC entity would have to be codified either by law or by Federal Aviation Regulations, according to FAA officials. FAA indicates this codification would be a time-consuming process. Furthermore, FAA identified two areas where identifying roles and responsibilities would be key.

- *Global harmonization and leadership*—In addition to the selected experts, FAA officials told us that roles and responsibilities related to global harmonization or global leadership issues could change. Currently, FAA is responsible for negotiating and adopting global standards and recommended practices for the United States Therefore, FAA and a new potential ATC entity would need to determine roles and responsibilities for participation in these forums. The FAA and new ATC entity would also need to establish accountability and responsibility for implementing and harmonizing air traffic control modernization efforts, such as through the International Civil Aviation Organization (ICAO)[38] Block Upgrades, by working with

[37] GAO has found that FAA's rulemaking, like that of other federal agencies, is a complicated process that has taken years to complete. GAO, *Aviation Rulemaking: Further Reform is Needed to Address Long-standing Problems.* GAO-01-821. (Washington, D.C.: July 9, 2001). In July 2015, we found that FAA had not finalized the small UAS rule by the August 2014 deadline. GAO, *Unmanned Aerial Systems: FAA Continues Progress toward Integration into the National Air Space*. GAO-15-610. (Washington, D.C., July 16, 2015). In June 2016, FAA finalized the small UAS rule.

[38] ICAO is the international body that, among other things, promulgates international standards and recommended practices in an effort to harmonize global aviation standards.

their respective counterparts (both regulators and ANSPs) across the globe.[39]

- *Environmental Protection*—Currently, FAA reviews and approves air traffic actions such as proposed procedural, airspace, or other changes that are subject to the National Environmental Policy Act (NEPA).[40] FAA officials may respond to concerns about noise from communities around airports. FAA currently does NEPA assessments to evaluate the environmental impacts of those flight paths including an evaluation of noise impacts based on federal standards. If a transition were to occur, FAA officials said a key issue would be to determine what entity—the ATC entity or the remaining safety regulator—would manage environmental issues and if it were the ATC entity, would it be required to follow federal NEPA requirements.[41]

Coordination and Communication

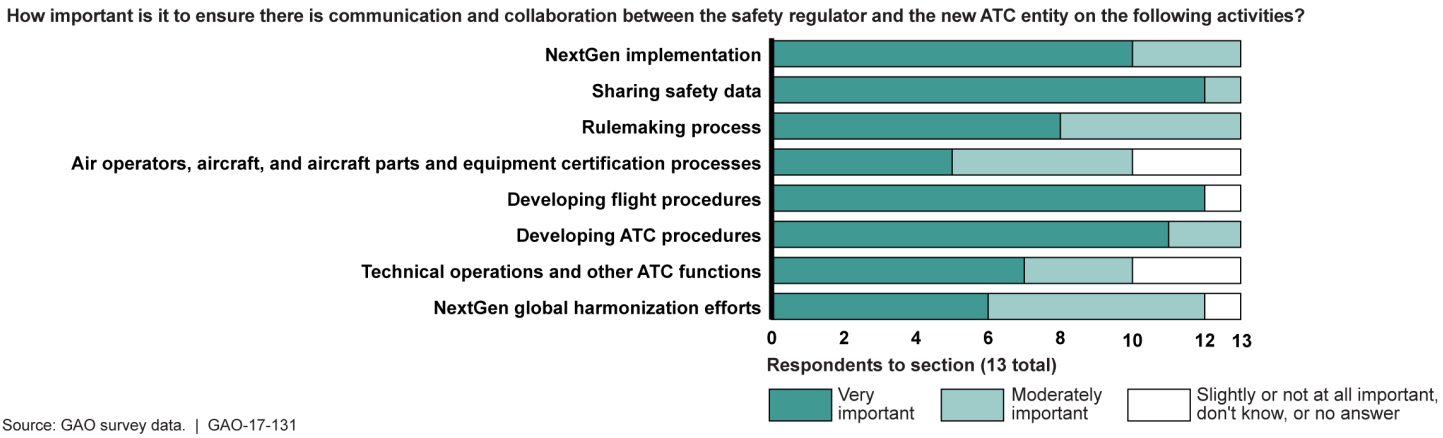
According to experts we surveyed, if a transition were to occur, once the roles and responsibilities are set up, it would be important to ensure coordination and communication between the safety regulator and the new ATC entity. Experts responded that coordination and communication between the safety regulator and the ATC entity would be very important for many activities. See fig. 2 for list of activities and experts' thoughts on the importance of coordination and communication.

[39] The International Civil Aviation Organization launched the Aviation System Block Upgrades —a framework to ensure global interoperability.

[40] Pub. L. No. 91-190, 83 Stat. 852 (1970), codified, as amended, at 42 U.S.C. §§ 4321-4347. NEPA generally requires federal agencies to evaluate the potential environmental effects of actions they propose to carry out, fund, or approve (e.g., by permit) by preparing analyses of different comprehensiveness depending on the significance of a proposed project's effects on the environment—from the most detailed Environmental Impact Statements to the less comprehensive Environmental Assessments and Categorical Exclusions.

[41] Noise impacts associated with changes in air traffic are of increasing concern to communities around airports, especially as NextGen procedures are implemented. We previously found that FAA needs to continue to ensure noise grants meet eligibility criteria, align with its goals and are measure accurately. GAO, *Airport Noise Grants: FAA Needs to Better Ensure Project Eligibility and Improve Strategic Goal and Performance Measures.* GAO-12-890. (Washington, D.C.: Sept., 12 2012).

Figure 2: Experts Views on the Importance of Communication and Coordination between the Safety Regulator and New Air Traffic Control Entity



Source: GAO survey data. | GAO-17-131

For example, 12 of 13 experts indicated that working together to share safety data and develop flight procedures is very important. According to FAA, the current quality and ease of data sharing are very good between the air traffic organization and aviation safety organizations. FAA also stated that it would expect that to be more challenging if the entities were separated.

Eight of 20 aviation stakeholders who discussed this issue expressed concerns about the potential impacts of a separation on coordination, especially for NextGen implementation. For example, an aviation stakeholder highlighted the ongoing coordination across FAA offices to revise ground clearance data communications between ground controllers and pilots as an example of current coordination efforts across the FAA and industry. The stakeholder sees this as a partnership that could be broken if ATO and safety oversight functions were separated into two different organizations. According to another stakeholder, that transition might improve things in the long term, but it would take time to manage and impact progress in the short term. However, another stakeholder mentioned that there should be no concerns about having less coordination as a result of separating NAS operations and safety regulation into different organizations, stating that once standards are in place and people know what is expected, it should not be a problem.

We previously have found that current modernization efforts span FAA lines of business (e.g., the NextGen Office and air traffic and aviation safety organizations) and require coordination between multiple FAA lines

of business and that maintaining this coordination throughout the parts of the aviation system including the industry could be important and potentially difficult.[42]

FAA officials cited a number of cross-cutting activities— such as DOD coordination, security functions, and environmental responsibilities— that would need to be considered and addressed as part of a transition

- *DOD coordination*—As discussed earlier, DOD contributes approximately 15 percent of NAS services, and DOD and FAA currently collaborate in a variety of ways to ensure the continued safety of the NAS. According to FAA officials, the existing DOD-FAA relationship is likely to change with a separation of the ATC function. For example, it is unclear if established air defense procedures could be assumed by a non-governmental organization.[43] Similarly, DOD officials also told us the current collaboration with FAA and the aviation industry on UAS, NextGen, and safety/rulemaking committees benefits FAA, the DOD mission, and the NAS as a whole.
- *Security functions*—Many of the FAA's security functions are integrated throughout the agency and coordinated with other governmental agencies. For example, FAA provides and receives critical information and analysis throughout the intelligence, defense, and law enforcement communities. Such information used to promote safety includes that related to terrorism, counterintelligence, cyber security threats, as well as insider threats to the NAS. FAA indicated that maintaining such coordination is key to the security of the U.S. air system.
- *Environmental responsibilities*—Currently, FAA reviews and approves air traffic actions such as when ATO proposes a procedural, airspace, or other changes that may result in environmental impacts pursuant to the National Environmental Policy Act. As mentioned earlier, noise is

[42] GAO, *Air Traffic Control System: Selected Stakeholders' Perspectives on Operations, Modernization, and Structure*, GAO-14-770 (Washington, D.C.: Sept. 12, 2014).

[43] FAA works with DOD, the Department of Homeland Security, and other government agencies (e.g., the Drug Enforcement Administration) to ensure information regarding certain government aircraft operations are not generally broadcast to the public where such public knowledge would compromise the government's objectives (e.g., drug interdiction). If air traffic control services were restructured, FAA would have to determine how such objectives could be accomplished through a private entity.

a primary environmental concern around airports and the surrounding communities, resulting from changes in air traffic procedures.[44] According to FAA, it coordinates with airports and communities to deal with the environmental impacts of air traffic's actions. FAA officials said that if a transition were to occur, it would be important to consider how coordination would occur to respond to environmental concerns.

Safety Oversight Considerations

Experts we asked about ensuring that the safety regulator would be effective responded that if a transition were to occur, FAA would need to make changes to fulfill its oversight and safety role. Specifically, experts we surveyed responded that it would be "very necessary or somewhat necessary" to make several changes to ensure that FAA is an effective safety regulator, such as streamlining the rulemaking and procedure approval processes.[45] (See fig. 3)

Figure 3: Expert Views on the Necessity of Specific Changes to Ensure That Federal Aviation Administration Is an Effective safety regulator

Source: GAO survey data. | GAO-17-131

Note: ATC is Air Traffic Control

[44] See GAO-12-890.

[45] We received survey responses from 13 of 14 experts that received this portion of our survey.

Experts and aviation stakeholders we spoke to, as well as our previous work, raised concerns with FAA's current safety oversight system. For example, according to one expert, in order for the regulatory function of the FAA to improve, irrespective of any potential ATC transition, the regulator must move substantially toward risk-based oversight. In addition, a stakeholder stated if ATC operations and safety oversight are separated, there may not be much change in safety oversight unless the culture changes. According to this stakeholder, the costs for pilot certifications has increased due to the length of FAA's process. Further, the stakeholder believes that technology upgrades also have a long certification process. In addition, one stakeholder stated FAA is stove-piped and can't keep up with technological advances even with a restructure. For example, the stakeholder stated that the industry found out in the last couple of years that FAA is not agile enough to address emerging issues, as evidenced by the slow rulemaking process for the integration of UAS's in the national air space. We also previously found that FAA had difficulty responding quickly to requirements in the FAA Modernization and Reform Act of 2012 to develop regulations for safe operation of UAS's in the national air space.[46] FAA officials indicated that the agency is committed to making risk-based decisions.

Eight of 13 experts surveyed responded that separating ATC operations from the safety regulator could have a positive effect on the safety regulator. For example, one expert noted that "while separating ATC functions would result in a smaller FAA, it would allow the safety-specific workforce to grow because the Administrator would be relieved of responsibility for trying to find the right balance between safety and the ATO." The expert added that "shorn of the obvious conflict of interest that comes with vesting responsibilities for safety regulation and air traffic control in the same agency, the safety staff's performance would improve, along with the safety of an already safe system." Another expert responded that ensuring the safety regulator is effective may not be a challenge that is increased, but actually may be lessened by virtue of separating the air traffic control operator so that FAA leadership can focus more intensely on the aviation safety office. Another expert responded that even in a restructuring, FAA will have to make changes to improve its

[46] GAO, *Unmanned Arial Systems: Efforts Made toward Integration into the National Airspace Continue, but Many Actions Still Required*, GAO-15-254T (Washington, D.C.: Dec. 10, 2014). Also see discussion in footnote 37 above.

oversight and safety regulatory role and address existing problems with the length of FAA's standard making and certification processes.[47]

According to a consultant's 2014 study sponsored by the FAA,[48] of six countries that separated the regulator from the ATC entity, safety was not reduced.[49] The study did indicate that the three countries included in our case study (U.K., Canada, and New Zealand) as well as Australia moved toward a risk-based approach for safety from a compliance-based model. The report concluded that this change in safety oversight required a culture shift that was difficult and also requires strong data collection and quality-control procedures.

Workforce Issues

At the center of change management initiatives are the people affected.[50] Most experts who responded to our survey (25 of 29)[51] responded that managing human capital will be a very or moderately challenging issue to resolve in an ATC restructuring. Based on our literature review, survey of selected experts, and interviews with aviation stakeholders, issues that should be considered in any organizational change include (1) staffing, hiring and compensation and (2) the ability to strike and engage in collective bargaining.

[47] See GAO-14-770. Twelve of 76 aviation stakeholders interviewed for this report cited as a challenge that FAA's process for certifying safety, aircraft, and avionics, among other things, takes too long or is inconsistent.

[48] MITRE, *CAA International Structures*, MP140527 (October 2014). While we did not verify these findings, officials we interviewed in the three countries agreed that safety was not negatively affected.

[49] The MITRE study reported that the safety record of the ATC entity was equal to, or better than, the record prior to the separation. It also referred to "The Effects of Air Traffic Control Privatization on Operating Cost and Flight Safety," *The Journal of Aviation/Aerospace Education & Research*, Volume 14, Article 8, Number 3 JAAER (Spring 2005).

[50] As we have previously found, the key to a successful merger and transformation is to recognize the "people" element and implement strategies to help individuals maximize their full potential in the new organization, while simultaneously managing the risk of reduced productivity and effectiveness that often occurs as a result of the changes. See GAO-03-669.

[51] All 32 experts received this question and 29 of them responded.

Staffing, Hiring, and Compensation

About half of the experts we surveyed (7 of 13)[52] responded that a separation would have a "large negative impact" or "small negative impact" on different aspects of the safety regulator including staffing levels and expertise. (See app. II.) Experts told us there will be competition for labor between the two organizations because an ATC entity, in many cases, would create internal departments (e.g., safety, procedure design and evaluation) that will mirror those in the safety regulator to help the ATC entity deliver safe services and comply with the requirements imposed by the safety regulator.

In addition to the experts, 9 of 20 aviation stakeholders who discussed this issue felt that a separation could negatively impact the safety regulator's ability to hire and retain talent. For example, one stakeholder noted that there may be a "brain drain" from the safety regulator to the ATC entity, which could have some negative impacts on the safety regulator's ability to maintain the technical capabilities to do safety inspections. Further, some aviation stakeholders indicated that it would be important to maintain existing pension and/or other benefit programs, expressing various concerns about the potential impact of any changes to these programs, such as retirements of qualified staff who might either leave that type of work or take their pensions and go to work for the new ATC entity. According to FAA officials, 13 percent of air traffic controllers and 18 percent of ATC system technicians would be eligible to retire by 2018.

Experts we surveyed shared their views on various key issues related to employee compensation and benefits. For example, most experts who responded to this portion of our survey (8 of 11)[53] responded that it was "very" or "moderately important" to maintain the existing benefits such as pensions, seniority preferences or benefits, union agreements and savings plans for federal employees who transfer from FAA to the new ATC entity. (See app. II.). In transitioning to a non-government entity,

[52] We received survey responses from 13 of 13 experts who received this portion of our survey.

[53] We received survey responses from 11 of 11 experts that received this portion of our survey.

NAV CANADA provided similar benefits to the employees before and after the transition to maintain morale. One expert also pointed out that "while this issue will be very important for existing employees of the federal government, it may become less important for new employees hired after the transfer."

Ability of ATC Employees to Strike and Engage in Collective Bargaining

According to experts we interviewed, whether to permit air traffic controllers to strike would be a key issue. Further, according to a recent consultant report, during 2010 through 2015, there were 167 days of ATC strikes in the European Union affecting 475,000 flights and the report estimates the actions cost €9.5 billion in European Gross Domestic Product. Currently, ATC controllers, as federal employees, are prohibited from striking, and most experts who responded to this part of the survey (9 of 11)[54] responded that they do not think that the new ATC entity employees should be able to strike.

Another workforce issue is how to proceed with collective bargaining and ensure time is available to work through the labor agreements. As shown in table 2, there are multiple unions that could be affected in an ATC transition and determining how to proceed with bargaining agreements could take time. Union officials noted that they would like to see the existing labor bargaining agreements and pensions along with the same labor leadership transferred intact. According to FAA officials, there are a number of collective bargaining units that may be affected by a transition, as many of them are coming up for negotiation in the next 2 to 3 years.

Table 2: Collective Bargaining Units and Number of Federal Aviation Administration Employees Represented

Collective bargaining unit	Units	Labor agreements	Employees
National Air Traffic Controllers Association	16	4	18,349
Professional Aviation Safety Specialists	5	2	10,993

[54] We received survey responses from 11 of 11 experts that received this portion of our survey.

Collective bargaining unit	Units	Labor agreements	Employees
American Federation of State, County, and Municipal Employees	1	1	2,298
American Federation of Government Employees	5	4	1,556
National Federation of Federal Employees	3	1	644
Professional Association of Aeronautical Center Employees	2	3	322
National Association of Government Employees	3	3	250
Laborer's International Union of North America	1	1	205
Total represented	**36**	**19**	**34,617**
Unrepresented			**1,327**
Non bargaining			**9,566**
Total			**45,510**

Source: FAA. | GAO-17-131.

Funding and Financing Issues to be Considered Would Depend on the ATC Structure

In our discussions with selected experts, stakeholders, and FAA officials, various funding and financing issues arose as key considerations when transitioning to an ATC organization. If a transition of the U.S. ATC were to occur, selected experts indicated that the type of funding and financing system that should be set up would depend on the type of organizational structure being implemented. Further, a variety of issues surround the transfer of ATC assets and their valuation. The valuation of liabilities—including those of vested employee benefits—also arose in our discussions with experts and stakeholders.

Issues for Funding and Financing an ATC System

In transitioning to a new ATC entity, funding and financing an ATC system pose a number of issues that will need to be considered, according our selected experts. These issues include how to set up a user fee system, whether there needs to be some economic oversight of the fee-system, how to mitigate economic and financial risks to the system, and how to fund the remaining government (safety) oversight function.

Setting User Fees

Many ANSPs worldwide charge some type of user fees to recover their air navigation services costs. We discussed a variety of issues regarding user fees with selected experts and stakeholders, and FAA officials.[55]

Most of the experts who responded to this portion of our survey (17 of 18)[56] responded that, if the United States were to transition its ATC entity, a user-fee system should be implemented to fund the new ATC entity. Additionally, most experts (17 of 18) responded that fees should be set such that, in the aggregate, all costs of running the system are covered. That is, the fee system should be designed to provide adequate revenue for the new entity. Notably, most of the experts (17 of 18) responded that implementing such a user-fee system would be of a "moderate" or "great benefit" in several respects including that it (1) would provide a reliable stream of funding; (2) can be designed to cover all costs of the ATC system[57] (e.g., operations, research and development, and NextGen); and (3) can be transparent in that it would enable users to understand how they are being charged.

We asked these experts about the use of a "weight and distance" formula for setting user fees. This method would follow ICAO's charging principles, which recommend using cost-based user fees where the charge for each flight is based on distance flown and weight of the aircraft. The distance factor takes into account cost elements of providing air traffic services while the weight factor will tend to charge more to users that have a higher value of the service. Seventeen of the 18 experts

[55]In a report on user fee issues broadly, we previously established principles (equity, efficiency, revenue adequacy, and administrative burden) as well as discussed the tradeoffs between these factors as considerations in the design of federal user fees. GAO, *Federal User Fees: A Design Guide*, GAO-08-386SP (Washington D.C.: May 29, 2008). See GAO, *Aviation Finance: Observations on the Current FAA Funding Structure's Support for Aviation Activities, Issues Affecting Future Costs, and Proposed Funding Changes*, GAO-07-1163T (Washington, D.C.: Aug. 1, 2007).

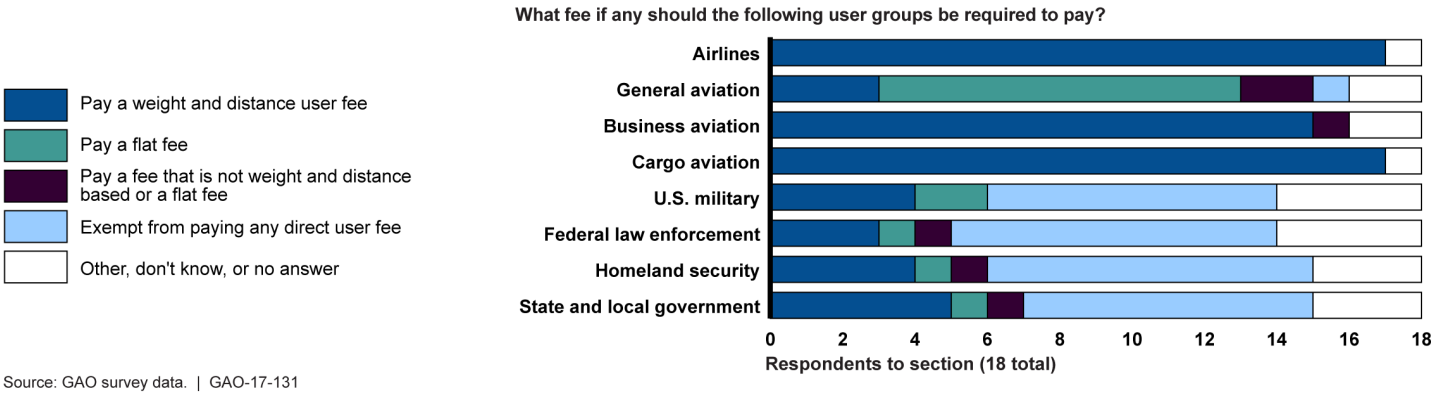
[56] We received survey responses from 18 of 20 experts that received this portion of our survey.

[57] The full cost of running the ATC system would include all operating costs, capital costs, and any other necessary costs such as, for example, building contingency funds to address unstable revenues over the course of the business cycle.

responded that a weight-distance user-fee structure would be appropriate. As we have discussed in previous work, a fee structure that better aligns fees with costs imposed by the various types of users could result in a more economically efficient use of the air traffic control system.[58]

When asked what fees different user groups should be required to pay for ATC services, most experts we surveyed responded that airlines (17 of 18), business aviation (15 of 18), and cargo aviation (17 of 18), should pay a weight and distance user fee. However, only a few of the experts (3 of 18) responded that general aviation users should be charged according to the same formula as commercial users. These experts responded that general aviation users should instead pay a flat fee for their use of the airspace, as is the case in Canada (see fig. 4).[59]

Figure 4: Expert Views on What Fees User Groups Should be Required to Pay for Air Traffic Control Services



Source: GAO survey data. | GAO-17-131

Experts provided several reasons that it would be appropriate to charge general aviation users differently than most other users of the airspace.[60]

[58] GAO, *Assigning Air Traffic Control Costs to Users: Elements of FAA's Methodology Are Generally Consistent with Standards but Certain Assumptions and Methods Need Additional Support*. GAO-08-76. (Washington, D.C.: Oct. 19, 2007).

[59] We received survey responses from 18 of 20 experts that received this portion of our survey.

[60] General aviation encompasses all civil aviation except scheduled passenger and cargo operations.

For example, one expert we interviewed stated that general aviation flights often use minimal ATC services so their costs to the system are actually quite small. Another expert responded that a potential decrease in general aviation's use of the airspace could reduce the number of people who become pilots in the United States, which could be detrimental for promoting an active community of pilots—some of whom go on to work in the commercial airline industry.

Slightly less than half of aviation stakeholders we spoke to (8 of 20) expressed support for a user-fee system to fund a new ATC entity in the event of a restructure. One aviation stakeholder who supported a user-fee system stated that such a system would provide a more stable funding source than the current funding approach. Another aviation stakeholder stated that implementing a user-fee system as recommended by ICAO principles should not be a challenge as there are various models around the world that have set up a user-fee system in this way. However, some other aviation stakeholders (4 of 20) stated that they did not support the use of a user-fee system. One aviation stakeholder stated that it would require a complex system to monitor air traffic control use and to process fees, and that such a system would have to be developed from scratch and may be difficult to do.

In addition, some aviation stakeholders had concerns about the use of user fees (6 of 20) and most of the concerns were similar to concerns of some experts—the increased costs that could occur for some user groups relative to the taxes that are currently being paid by these users. In particular, their concerns were that user fees for private pilots, cargo, business aviation, and general aviation might be higher under user fees compared to the status quo costs for these user groups. For example, an aviation stakeholder representing pilots stated that private pilots spend their own funds to fly and cannot pass along costs and raise prices like airlines do. Another aviation stakeholder representing the air cargo industry noted that this industry group has serious concerns that a user fee system could, in its estimation, raise fees by 30 to 80 percent if charged a fee according to a weight and distance formula.[61] This stakeholder stated that a formula without a weight component would be

[61] This estimate of what air cargo's fees would be is from the industry group and is based on their own analysis.

more appropriate for the cargo community because cargo gets severely penalized with the ICAO recommended weight-based charge.

FAA officials acknowledged that if a user-fee system were implemented according to ICAO's charging principles without any exceptions to the application of the formula, some users, such as cargo carriers, business aviation, and members of the general aviation community may be charged higher fees than they currently pay in taxes. DOD officials also raised a few issues to consider if the United States were to go with a user-fee system. First, DOD currently provides NAS services to both civil and military users including ATC services, airport and long-range radar surveillance and navigational aids. This contribution should be considered in a fee structure. Second, DOD benefits from international reciprocity that DOD officials estimate saves DOD approximately $200 million annually in international user fees. According to DOD officials, a new structure should consider whether the United States would continue to offer that reciprocity, and if not, what that would cost DOD. Third, as some experts indicated in their survey response, they believe that DOD would seek exemption from user fees as they believe the volume of their flights could place a financial burden on the DOD.

Economic Oversight of Fee Structure

Based on our selected experts, whether there is a need for economic oversight of a user-fee system is an issue that needs to be considered because the ATC entity would be a monopoly provider of ATC services and may have substantial leeway regarding its user-fee structure. According to experts that we surveyed and interviewed, whether an economic regulator would need to be in place would depend on the organizational structure of the ATC entity.

- *Non-profit entity*—Most experts (11 of 18)[62] responded that if the new ATC entity is a non-profit entity with a board of directors made up of user groups, an economic regulator would not be needed. One expert explained that in such a case because the Board of Directors is made up of various users, it will be self-regulated. An example of such a model would be NAV CANADA, the Canadian ANSP, which has an

[62] We received survey responses from 18 of 20 experts that received this portion of our survey.

oversight board made up of stakeholders—such as commercial air carriers, business and general aviation, government officials, and unions—whereby the board's membership has a vested interest in keeping rates at appropriate, cost-based levels.

- *For-profit entity*—Most experts (16 of 18) agreed that if the new ATC entity was a for-profit entity, an economic regulator would be needed. In our interviews, one expert explained that if the ATC entity were for-profit entity, like the United Kingdom ANSP (UK NATS), price regulation would be necessary. The entity, which would hold a legislatively-created monopoly, might have an incentive to set fees at higher levels than cost—resulting in higher prices for users. During our interviews, experts indicated that the economic regulator should be independent of the ATC entity and FAA and have the responsibility to serve the public interest. Five of 32 experts we interviewed indicated that the Department of Transportation could be asked to fill this role. Other suggestions included the Department of Treasury or the Surface Transportation Board,[63] which has jurisdiction of railroad rate and service issues.
- *Partially or fully-owned government entity*—Experts were split (8 of 18 responded 'yes' and 12 of 18 responded 'no' or 'maybe') on whether an economic regulator would be needed if the entity was a "partially government-owned" or "fully government-owned" entity.

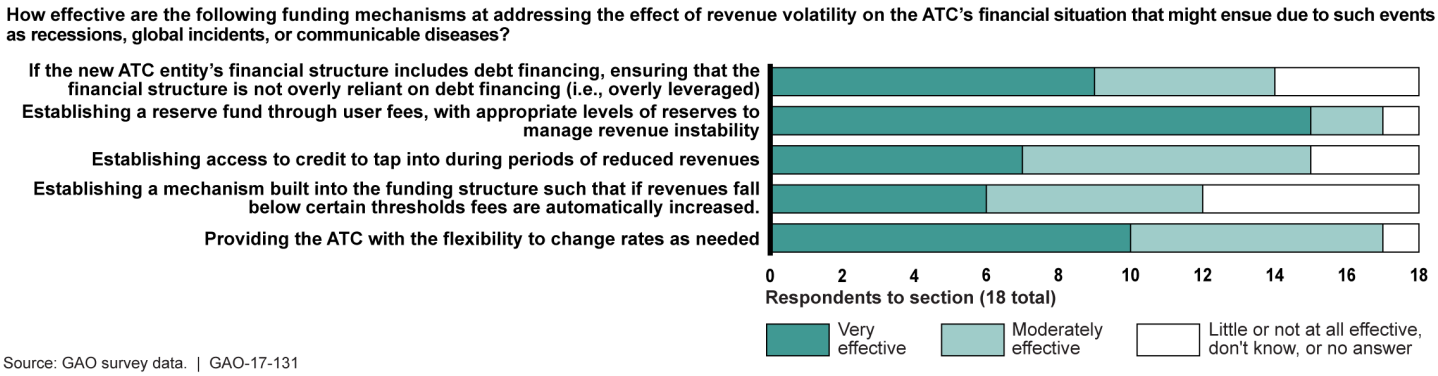
Mitigating Potential Economic and Financial Risks

Another key issue that would need to be considered, according to the experts, is how a new entity would mitigate the risk of unforeseen events such as economic downturns that have affected traffic and revenue in the past, thus promoting the financial sustainability of the ATC entity over the long term. Mechanisms identified during our interviews included establishing a reserve fund financed largely through user fees, with appropriate levels of reserves to manage revenue volatility; providing the new ATC with the flexibility to change rates as needed, and ensuring the new ATC financial structure is not overly leveraged, i.e., overly reliant on

[63] The Surface Transportation Board is an independent establishment of the U.S. government administratively housed within the Department of Transportation. It is responsible for the economic regulation of interstate surface transportation to ensure that competitive and efficient transportation services are provided to meet the needs of shippers, receivers, and consumers.

debt financing.[64] Experts we surveyed responded that several funding mechanisms would be "very" or "moderately effective" to address the effect of revenue volatility due to unforeseen events, such as economic downturns, on the new ATC's financial situation. (See fig. 5)[65] We discuss later in the report how other international ANSP's took steps to implement such mechanisms.

Figure 5: Expert Views on Air Traffic Control Financial Mechanisms to Manage Revenue Volatility



Source: GAO survey data. | GAO-17-131

Note: ATC refers to Air Traffic Control.

Funding the Remaining FAA Functions

If the ATC function were to be moved to a new entity that was not a government agency, the government would continue many aviation oversight roles including, most notably, safety oversight. We asked experts what changes would be needed to ensure that the remaining FAA is an effective safety regulator. Nine of the 13 experts[66] who responded to this part of our survey responded that if an ATC transition were to occur, a more stable source of funding than what is currently in place would be either very necessary or somewhat necessary to ensure that FAA is an

[64] We previously reported on the role of reserves for fee-funded agencies; see GAO, *Federal User Fees: Fee Design Options and Implications for Managing Revenue Instability*, GAO-13-820 (Washington, D.C.: Sept. 30 2013).

[65] We received survey responses from 18 of 20 experts that received this portion of our survey.

[66] We received survey responses from 13 of 14 experts who received this portion of our survey.

effective safety regulator. As we reported in 2014, stable and predictable funding for FAA was a chief concern among stakeholders.[67] Seven of 13 experts responded that more funding than what FAA's Aviation Safety Office currently receives is either very necessary or somewhat necessary.

Also, four of the 20 aviation stakeholders we interviewed expressed concerns about how the remaining FAA functions would be funded. For example, two aviation stakeholders indicated that in addition to funding ATC functions, other functions such as funding airports should be considered—specifically, maintaining federal funds for Airport Improvement Program (AIP) grants.[68] One stakeholder mentioned that it would be difficult for airports to compete for general funds and believes AIP grants should be supported by aviation users through a dedicated tax stream. Another stakeholder mentioned that it is not clear if an ATC entity or the remaining FAA would be responsible for AIP; however, either way it would be important to determine how to raise funds for AIP grants.

FAA officials raised questions and concerns about how the remaining FAA would be funded if the ATC portion were spun off into a new organization. Currently much of FAA's budget is largely funded through the taxes and fees paid into the Airport and Airways Trust Fund, as mentioned above. If these fees were replaced with a set of user fees to support the new ATC entity, it is not clear the extent to which some of that funding might flow back to FAA. While it is possible that some of the new user fees would be paid to the FAA from the new ATC entity in return for certain services rendered, it is also possible that much, if not all, of the funding of the remaining FAA would be provided through general fund appropriations.

Issues Related to Valuing and Transferring the System

The ATC system is comprised of broad array of assets and related obligations.[69] According our selected experts and aviation stakeholders, in an ATC transition, several issues related to how the system and its

[67] See GAO-14-770.

[68] As mentioned earlier, most U.S. airports are publicly owned and funding for them comes from five main sources: airport-generated net income, federal Airport Improvement Program grants, Passenger Facility Charges, capital contributions, and state grants.

[69] This includes physical assets (e.g., facilities, equipment, land, etc.) and software, as well as existing leases and service contract obligations supporting ATC services.

assets are valued and transferred to the ATC entity would need to be considered. Part of that consideration would include whether the federal government should seek payment for the transfer of the ATC system, and if so, how the amount of that payment should be determined.

Payment to the Federal Government for Transferred Assets

Experts we surveyed were split on whether the federal government should receive payment in return for the transfer of the existing ATC system. Specifically, 8 of the 17[70] experts responded that the federal government should not receive payment for the existing ATC system, 7 of 17 responded that the government should receive payment for the existing ATC system depending on the entity's governance and ownership structure, and 2 of 17 responded the government should receive payment.

Of 7 experts who responded that a payment should be made depending on the governance model:

- All 7 responded that if the new ATC entity is a "for-profit" entity, the government should receive payment.
- All 7 responded that if the new ATC entity is a government-owned entity, the federal government should not receive payment for the existing ATC system.[71]
- Four of 7 responded that if the new ATC entity is a "non-profit" entity, the government should receive payment.
- Four of 7 responded that if the new ATC entity is a "partially-owned" entity, the government should receive payment.

(See app. II for all responses.)

[70] We received survey responses from 17 of 19 experts who received this portion of our survey.

[71] One expert we spoke to also indicated that another potential option is that the government could have a lease arrangement in which the ATC entity would operate the system but the government maintains ownership of the assets.

Of 8 experts we surveyed who responded that a new ATC entity should not pay for the system:

- All 8 responded that the new ATC entity should not pay for the system because much of the ATC system has already been paid for by users through ticket and fuel taxes.
- All 8 responded that the new ATC entity should not pay for the system because the payment would raise the level of financing needed and potentially have a significant impact (i.e., increase) on the level of user fees.[72]
- Seven of 8 responded that the new entity should not pay for the system because the payment might impose a significant financial burden on the new ATC entity, impacting its financial stability.
- Seven of 8 responded that the new entity should not pay for the system because determining a price for the ATC system would be a time-consuming, complex, and expensive undertaking.

Aviation stakeholders we spoke to generally agreed (14 of 20) that transferring system assets and determining a possible price for them is a complex issue, and four stakeholders provided a view on whether the new ATC should pay the government for the system. Two of the four aviation stakeholders stated the government should be paid for the assets and the other two stated the government should not be paid. The two who favored payment do not agree that users have already paid for the assets. The two who stated the government should not be paid indicated that determining an appropriate system valuation could be difficult.

While the administration has not taken a position on the matter, FAA officials acknowledged that arguments can be made for both requiring a payment and having no payment for the ATC system. For example, FAA officials we spoke with noted that, conceptually, the assets have already been paid for by NAS users and if payment is given to the government, the users of the NAS (the same user group, though different individuals)

[72] Generally, regardless of whether a payment is made for the transfer of the system, a valuation of the transferred assets would be necessary to record the value of such assets in the set of accounting books and records for the new entity, including for example, a balance sheet that records its assets and liabilities. Additionally, the value of the assets would be depreciated over time—which would be a system cost to be recouped through user fees.

would effectively be paying again. These officials also noted that if there were payment for the existing system, that additional financial burden might cause investments in aviation infrastructure to be deferred by the new ATC entity. According to FAA officials, to the extent that the users of the NAS paid for these assets once already while it was in the federal government's hands, it would seem duplicative to require that same group of stakeholders to pay for the assets again because they were transferred to the ATC. FAA officials added that to the extent that assets are being transferred and the related liabilities are retained by the FAA, there might be some additional considerations around whether there should be some continuing linkage between the asset and the liability or remuneration for retaining the liability. Ideally, the liabilities should transfer with the related assets, but concerns about costs may arise if it is desired that the federal government retain certain of these liabilities.

ATC System Valuation Method

If the ATC entity were to pay the federal government for acquiring the ATC system, a valuation of the system might be a starting point for determining the payment amount.[73] A valuation would also assist the new ATC entity in developing a balance sheet to record its assets and liabilities. Our discussions with experts suggested that there are a variety of issues for determining the most appropriate method for valuing the ATC system. Common valuation methods include (1) market value of the system—which could also be referred to as a "going concern" —the value of an entity based on an estimate of its expected future discounted cash flows and (2) net book value, which is the value of the entity's assets minus the value of its liabilities.[74] In addition, the value of the ATC could be constructed by valuing individual assets at either their market value or book value. In this case, if an asset has an alternative use it could be assessed at its market value, but those assets with no other use would be valued at their book value.

Experts we surveyed were mixed on what valuation method should be used for valuing the ATC entity if a payment is made for the system.

[73] In finance, valuation is the process of estimating what something is worth. Items that are valued are usually a financial asset or liability.

[74] The book value of assets is the original cost of the assets net of depreciation.

- Seven of 17 responded that an appropriate method would be to use a combination of market value and net book value of the assets in which assets such as land that could have an alternative use are appraised at their individual market value (what the asset could be sold for), while assets that are particular to ATC use are valued at net book value,
- Four of 17 experts responded that a "going concern" approach for the value of the whole system would be the most appropriate method.

While experts expressed these preferences for particular ways of valuing the ATC system and assets, many experts indicated that such a valuation is only a starting point for determining the price or payment that a new entity might remit to the federal government in return for transfer of the ATC system. Notably, other factors were mentioned as needing consideration to determine the transfer price, such as the impact on the level of user fees and the financial burden on the new ATC entity.

Aviation stakeholders did not comment on which valuation methods should be used, but stakeholders we interviewed raised questions and concerns related to transferring FAA assets, including questions about how existing service contracts[75] would be transferred as well as the impacts to the contract air traffic control tower program. Some of the aviation stakeholders (6 of 20) agreed that consolidation of facilities would be difficult; with several noting that political issues[76] would continue to have an impact. Some of the stakeholders (5 of 20) responded that the new entity will likely take on the existing service contracts as is. One stakeholder noted that the contracts are complex agreements contractors may negotiate differently with a not-for- profit entity than with the federal government.

[75] An example of a current service contract is Automatic Dependent Surveillance-Broadcast, which is a technology that enables aircraft to continually broadcast flight data—such as position, air speed, and altitude— among other types of information, to air traffic controllers and other aircraft.

[76] For example, Congress members could be concerned about closing facilities that are in the areas they represent.

FAA officials responded that each contract would have to be renegotiated and/or novated[77] on a case-by-case basis as many of the existing clauses may be inapplicable to a contract where neither of the parties is a government agency. Given the proposed duration of the transition anticipated by proposed legislation,[78] FAA officials assume that all necessary contracts will be novated to the new entity. Further, FAA officials did not comment on which valuation methods should be used, but it cited that the primary challenge associated with transferring assets would be to determine responsibilities for shared assets. For example, FAA has assets that support the power supply of both NAS operations and non-ATC business functions, and thus what organization should own power supply would have to be figured out if a separation was to occur. Other challenges that would arise are that some of FAA's assets sit on airports, national parks, national forests, and military bases, and there are likely to be some assets that both the FAA and the ATC entity would want to use (for example some buildings that are joint use, such as utilities, telecommunications infrastructure, Academy, Logistics and Technical Center facilities and equipment).

Liability Assessments

The responsibility for accrued retirement benefits (e.g., of pension and retiree health insurance benefits) and other liabilities is also a key funding consideration.[79] Specifically, the question of what organization will be liable for the portion of retirement benefits attributable to employees' years of service prior to the establishment of the new entity impacts aspects of the financial footing an organization is starting on and how these liabilities will be financed. As we reported in the past[80] on the

[77] Generally, a novation substitutes a new party to a contract and discharges one of the original parties by agreement of all three parties. A novation extinguishes an old obligation and establishes a new one.

[78] The Aviation Innovation, Reform, and Reauthorization Act of 2016 (H.R. 4441, 114th Cong. (2016)) was last reported out from the House Transportation and Infrastructure Committee on February 11, 2016, and as of September 29, 2016, was pending in the House.

[79] The responsibility for other actual or potential liabilities, such as for environmental liabilities, would also be a key consideration.

[80] *U.S. Postal Service: Strategies and Options to Facilitate Progress toward Financial Viability*. GAO-10-455. (Washington, D.C.: Apr. 12, 2010) and *U.S. Postal Service: Allocation of Responsibility for Pension Benefits between the Postal Service and the Federal Government.* GAO-12-146. (Washington, D.C.: Oct. 13, 2011).

financial challenges facing the U.S. Postal Service, which faces challenges due in part to unfunded retirement benefits, it will be important to understand the existing benefit liabilities and future funding of those benefits for any new entity. Questions to be addressed include to what extent the new entity is made responsible at its outset for any portion of existing pension and retiree health liabilities and to what extent the new entity will be provided corresponding funds to offset these initial liabilities. One expert told us it is essential that the accrued liability at the date of the transfer and the annual future costs for employee benefits be determined.[81] For example, this expert said that the pension plan(s) may have a significant unfunded liability at the date of the transfer that could result in the new ATC entity essentially being insolvent on day one and incapable of making the necessary contributions going forward.

Numerous decisions would have to be made regarding employee retirement benefits. For example, the new entity's benefit programs might be privately administered by the new entity, or depending on the structure, the new entity might continue to participate in the federal government's benefit programs, with a separate accounting of costs attributable to the new entity. Further, numerous decisions would have to be made regarding the funding of retirement benefits. Because retirement benefits involve obligations extending decades into the future, actuarial estimates have to be made of the size of an entity's retirement liabilities and the amounts that would be needed to fund these benefits.

Another consideration is whether retirement benefits would have any kind of guarantee, and by whom, if funding for them proved to be inadequate. A related issue would be appropriate safeguards on how potentially large pools of retirement funds would be invested, which could affect risks borne by FAA workers, retirees, or customers, or by taxpayers. As noted earlier, events such as economic downturns could adversely affect air traffic and revenue. Assets of the CSRS and FERS pension programs currently are invested solely in special-issue U.S. Treasury securities. To the extent any retirement funds of the new entity are invested in risky

[81] Another consideration would be the allocation of responsibility for funding these benefits between the new entity and the federal government. For example, the federal government might be given responsibility for the portion of retirement benefits attributable to employees' years of service prior to the establishment of the new entity, but even that principle requires additional definition.

assets, such as in the stock market, an economic downturn could both decrease the new entity's revenue and increase its unfunded retirement liabilities at the same time.

FAA officials indicated that responsibility for environmental cleanup, such as land that has been contaminated should also be considered in a transition; such a responsibility could be significant. A new ATC entity could be liable for at least some of these costs.[82]

A Transition Would Take Time and Involve Costs

Experts we interviewed indicated that if a transition were to occur, time should be taken to ensure it was properly planned and implemented. A transition would involve legal, financial and administrative costs. Similarly, we have previously found that any organizational merger and transformation requires, among other things, an implementation plan beforehand and time to manage the transition.[83]

- *Time*: When asked how challenging ensuring an adequate amount of time to plan and implement a transition would be, 9 of 29 experts responding indicated it would be very challenging and most of the experts (17 of 29) experts responded that it would be moderately challenging.[84] Further, experts we surveyed provided various estimates for how long different parts of a transition process—enacting legislation, negotiating, planning, and implementing—would take. The most common answers were 1 year each for enacting legislation, negotiating and planning and 2 years for implementing (see below). One expert mentioned that these steps may not have to be done sequentially.
- 15 of 32 responded that it could take 1 year for legislation.
- 12 of 32 responded that it could take 1 year for negotiations.

[82] Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), potentially responsible parties such as current or former owners or operators may be liable for conducting or paying for cleanup of hazardous substances at contaminated sites. Pub. L. No. 96-510, 94 Stat. 2767 (1980) (codified as amended at 42 U.S.C. §§ 9601-9675).

[83] See GAO-03-669.

[84] We received survey responses from 29 experts on the question on how challenging time would be and 32 experts responded to the estimate of length of time needed.

- 10 of 32 responded that it could take 1 year for planning.
- 10 of 32 responded that it could take 2 years for implementation.

One expert suggested studying other countries' transitions (see discussion of lessons learned from other countries below). An aviation stakeholder who mentioned the Metropolitan Washington Airports Act of 1986[85] transition believed an ATC transition could take 3 to 5 years. He also mentioned that the transition to a private ATC entity would be most complicated and thus take more time. Some aviation stakeholders also indicated that it would take time to answer issues identified, pointing out that the transition would need to be a two-phase approach, planning and implementation.

- *Costs*: Experts we interviewed also indicated that costs would be involved in any transition. When asked what key costs such as for legal, financial, administrative, and other services would be associated with any transition, most of the experts we interviewed indicated that some of these costs would be involved. For example, experts stated that legal and financial advisors may need to be hired to assist the federal government in the transaction and that costs for these services would vary depending on the new ATC entity's ownership structure. One expert noted that initial legal and financial services for analyzing a potential transaction could cost between $8 to $10 million dollars. Another expert noted that if the new ATC entity were a government corporation, financial advisory services could be $1 million. Experts also noted that there would be administrative costs. For example, one expert noted that there would be administrative costs in restructuring the remaining FAA safety organization.

[85] Pub. L. No. 99-500, 100 Stat. 1783-373. The Metropolitan Washington Airports Act of 1986 provided for the lease of Washington Dulles International Airport (Dulles) and Washington National Airport, now known as the Ronald Reagan Washington National Airport (Reagan National) and the transfer of operating responsibility from the federal government to the Metropolitan Washington Airports Authority.

Experiences of Selected Countries May Provide Lessons Learned for Mitigating Issues Associated with an ATC Transition

Many countries have transitioned their ATC services from national civil aviation authorities to independent, self-financed ANSPs (an ATC entity). We reviewed documentation pertaining to the changes and spoke to officials and stakeholders involved in ATC transitions in Canada, the United Kingdom (U.K.), and New Zealand. Through our discussions with foreign officials, stakeholders, and review of documents, we identified several lessons that could be learned from these countries' experiences with restructuring their ATC services on how to mitigate and address issues associated with (1) facilitating communication and coordination between the ATC entity and the safety regulator, (2) developing a funding and finance structure, and (3) identifying the appropriate amount of time needed to plan and implement an ATC transition.

Organizational Issues: Communication and Coordination throughout the Transitions in Selected Countries Were Key

Officials involved in ATC transitions in countries whose ATC transitions we reviewed told us that (1) establishing a transitional period to delineate roles and responsibilities and (2) establishing communication and coordination mechanisms early in the process were some examples of lessons learned for mitigating and addressing challenges associated with having a separate ATC entity and the safety regulator and transitioning employees.

Establishing a Transitional Period to Figure Out How to Delineate Roles and Responsibilities

Establishing a transitional period to delineate roles and responsibilities between the new ANSP and safety regulator helped reduce potential challenges adjusting to their new roles. For example, NAV CANADA (the new ATC entity) agreed to not make any changes that had to do with operations during the first 2 years. During that period, the procedures and manuals of operation stayed the same while NAV CANADA and Transport Canada (the safety regulator) worked to identify how to delineate roles and responsibilities between the two entities. In some cases, it was not clear which entity would be responsible for specific roles and responsibilities. According to NAV CANADA officials, aeronautical information services became one area where there were some challenges with determining how to delineate roles between Transport Canada and NAV CANADA. The transitional period allowed the two entities to figure out which roles and responsibilities could be assumed by which entity. The transitional period helped Transport Canada adjust to its role as a regulator. Further, according to Transport Canada officials we spoke to, some of their staff faced challenges with adjusting from a compliance regime to a risk-based safety management system.

The U.K. also took steps to get the two entities to understand their roles and responsibilities. According to an official from the UK NATS (the new

ATC entity)' oversight organization—the U.K.'s Civil Aviation Authority (CAA), prior to the separation of the ATC entity and the oversight organization, its oversight agency operated as a shadow regulator of the ATC entity. This included providing input into developing the charging procedures for user fees and advice on what the charges should be. When the restructuring occurred, the oversight agency's role changed. At that point, the CAA had a much smaller role—that of the safety regulator for UK NATS.

Establishing Ongoing Communication between the ANSP and the Safety Regulator through Formal and Informal Mechanisms

An Airways New Zealand official noted that there are formal and informal structures in place for the regulatory functions and the more collaborative roles taken when developing new concepts or technology. The official told us that good relationships ensure strong cooperation and no surprises between Airways New Zealand and the regulator. According to NAV CANADA and Transport Canada officials, several committees were eventually formed to facilitate coordination between the ANSP and the safety regulator, and to delineate responsibilities. The committees are both formal and informal and serve as a mechanism to maintain ongoing communication. According to Transport Canada officials, NAV CANADA and Transport Canada have been able to develop a mutual trust through ongoing communication and have established a culture of trust that has been maintained throughout the years. NAV CANADA has attended ICAO meetings that Transport Canada did not have the funds to attend, and NAV CANADA then has shared information with Transport Canada officials, for example. According to Transport Canada, a key to this level of open communication and trust has been the leadership at both entities that has fostered a cooperative relationship between the two entities. Likewise, officials in the UK mentioned that there are periodic fact-finding studies, consultations with customers to understand requirements, and regular reviews to determine what is performing well.[86]

Establishing Ongoing Communication with Employees to Ease Transition

According to UK NATS and union officials, communication with employees is key. For example, both before and during the transition, UK NATS officials spent a lot of time with the union representatives and ATC staff to reassure them. This communication included attending union meetings, conferences, and holding sessions with key representatives

[86] GAO, *Managing for Results: Key Considerations for Implementing Interagency Collaborative Mechanisms.* GAO-12-1022, (Washington D.C. Sept. 27, 2012).

and staff. NAV CANADA officials also stated it was important to get the employees/unions' buy-in early. Eight unions were part of the process. NAV CANADA reached an agreement with all eight unions to protect their contracts for 2 years prior to transition. They also protected employee pensions. The biggest challenge NAV CANADA faced was on the management side. The new environment was a challenge for managers who had never worked outside of government, and NAV CANADA ended up replacing people and filling those roles mostly through promotions from within. We previously found that establishing a communication strategy to create shared expectations, communicating early and often to build trust, and encouraging two-way communication, are key practices for organizational transformations.[87]

Funding and Financing: Obtaining Aviation Stakeholder Input Early in the Process and Allowing for a Transitional Period Were Key

Officials in selected countries involved in ATC restructuring and transitions told us that (1) obtaining input from stakeholders early in the process, (2) establishing a transitional period, and (3) building risk mitigation mechanisms into the finance structure were some examples of lessons learned for mitigating and addressing challenges associated with developing a funding and finance structure.

Obtaining Stakeholder Input Early about Financing Structure

Officials from Canada, the U.K., and New Zealand all told us that a critical component for implementing a user-fee system involved obtaining input about the finance structure for the new ATC entity. Although the governance structures for the three ANSPs differ, they all have implemented a system of user fees to fund ATC operations. According to officials involved in these transitions, in order to successfully implement a user-fee system, it was important to obtain aviation stakeholder input in the process. For example, in the case of NAV CANADA, stakeholder input was considered during the transition and obtained through an air-navigation services advisory committee[88] made up of aviation

[87] GAO-03-669.

[88] NAV CANADA Advisory Committee (NCAC) represents a broad cross-section of Canada's aviation community, including professional pilots, air traffic controllers, flight service specialists, technicians, airport representatives, air service operators, and officers of aviation organizations.

stakeholders. A team led by Transport Canada that included bargaining agents and public consultation groups was organized to review potential organizational alternatives for a new structure, revenue and user-fee structures, and identify any potential regulatory issues. According to a study examining the Canada ATC transition, the consultation process was thorough and input was obtained from a wide range of stakeholders including airlines, airports, unions, pilots, general and business aviation, safety organizations, and equipment suppliers.[89] According to the Air Transport Association of Canada and Canadian Air Traffic Controllers Association officials whom we spoke with, input from stakeholders played an integral role in the establishment of NAV CANADA, and without stakeholder involvement in this process, the NAV CANADA transition would have been very challenging to achieve.

In addition, user-fee systems were developed in consultation with various users. For example, NAV CANADA's user-fee system was developed in consultation with various aviation users, and there was some compromise involved in the process to obtain stakeholder buy-in. For example, one compromise was to not charge general aviation the way commercial users are charged. Instead, general aviation users pay a flat annual fee of $60 to $72 Canadian dollars. According to Canadian Operators and Pilots Association officials, if the fee were raised there would be a small increase in revenue for NAV CANADA as personal recreational general aviation brings in .02 percent of the corporation's total revenue.. User groups were also provided representation on the board of directors so that they could provide input in establishing fees, and protections were included in enabling legislation to ensure that rates are reasonable.

Likewise, in New Zealand, the official we spoke to told us that discussions were held between the new ANSP—Airways New Zealand (Airways)—and ATC users including airlines, general aviation and the military on what services they wanted and what they were prepared to pay. According to an Airways official, this consultation was done so that users would not see Airways user-fee rates as unfair. For example, Airways sets prices at a level that keeps general aviation services affordable while helping pay for the ATC's fixed costs.

[89] Clint Oster, and John Strong. "*Reforming the Federal Aviation Administration: Lessons Learned from Canada and the United Kingdom*" (2006).

Establishing a Transitional Period and Making Incremental Changes during That Period Helped Ensure a Smooth Transition

Another key lesson we identified through our literature review and interviews with officials is that the Canadian and U.K. transitions established a transitional period and used a phased approach to implement the user-fee system, helping to reduce risk. For example, in the case of the Canada transition, NAV CANADA introduced its user-fee system in two phases over a 2-year period. The first phase (which occurred in the first year) involved a reduction of the existing air transportation tax used to fund ATC operations and administered by the Ministry of Transport by a 50 percent, and the introduction of the user fee at a 50 percent rate charged to airlines. In the second phase (which occurred in the second year), the tax was removed and the user fee (consisting of a weight and distance charge) was fully implemented at a 100 percent rate. A Canadian Auditor Review of the transition concluded that risks inherent in the ATC transition were reduced because the user fees were implemented in two phases.[90] With respect to helping to provide NAV CANADA some financial certainty, the Canadian transition legislation[91] also authorized transition period payments from the Canadian government to NAV CANADA for 2 years. Further, the U.K. regulator operated as a shadow regulator of the ATC prior to the separation of the UK NATS including providing input on developing the charging procedures and advice on what the user fees should be.

Building Risk Mitigation Mechanisms into the Finance Structure

As UK NATS and NAV CANADA both learned, building in mechanisms to help mitigate financial risks is a key lesson. One of the weaknesses of the original UK NATS financial structure was that it was highly leveraged and a small equity investment. UK NATS' major stakeholder, the Airline Group,[92] had taken significant debt as part of its payment for the ATC system, with expectations that continued growth would ameliorate fixed fees agreed upon with its government regulator. However, immediately after the September 11 terrorist attacks, there was a downturn in air traffic, resulting in a drop in revenues. According to a report by the UK

[90] Transport Canada, "*The Commercialization of the Air Navigation System*" (October 1997).

[91] Civil Air Navigation Services Commercialization Act, June 20, 1996.

[92] The airline group is comprised of the following: USS Sherwood Limited, British Airways PLC, Monarch Airlines Retirement Benefit Plan Limited, EasyJet Airline Company Limited, Virgin Atlantic Airways Limited, Deutsche Lufthansa AG, Thomson Airways Limited, and Thomas Cook Airlines Limited.

National Audit Office, UK NATS was vulnerable to adverse events such as the decline in the level of transatlantic traffic, which accounted for 43 percent of its revenues, even though it represented only 14 percent of all flights. Given that the new organization was already highly leveraged and needed additional equity, UK NATS worked with the government to refinance and restructure the system, including finding a new investor and relaxing price caps by UK NATS' regulator.

Like UK NATS, NAV CANADA also experienced a significant downturn in traffic following September 11. However, NAV CANADA had established a rate stabilization account (RSA) to mitigate financial risks. Specifically, according to NAV CANADA officials, the RSA was established to reserve funds that could be used to (1) offset decreases in revenue, (2) maintain a strong liquidity position for operating and interest costs, (3) repay debt borrowings, and (4) reduce the frequency of user-fee changes. NAV CANADA's RSA has a target balance of $50 million in Canadian dollars, but this amount was not sufficient to mitigate the effects of from September 11, thus creating a negative balance in the RSA. According to one expert we interviewed, the RSA allowed the company to manage the consequences of the September 11 downturn over a number of years. According to the Congressional Research Service, the RSA appears to have been an effective mechanism in maintaining stable rates as NAV CANADA did not increase user charges between 2007 and 2014.[93]

Time and Costs to Transition: Examples Indicate a Transition Would Likely Take Several Years to Plan and Implement

Officials we spoke to in Canada told us it took about 1 to 2 years to put the ANSP organization in place with all the legal and financial decisions required, and subsequently 2 years to phase in collection of fees from users. Based on the work for a 2014 MITRE study[94] on international civil aviation authorities' transitions, MITRE officials found that it took up to 7 years to complete a transition from government authority to a new entity for the countries they reviewed. This time is in line with what we

[93] *Congressional Research Service, Air Traffic Inc.: Considerations regarding the corporatization of air traffic control* (January 2015).

[94] MITRE is a not-for-profit organization chartered to work in the public interest. MITRE manages four federally funded research and development centers, including one for FAA.

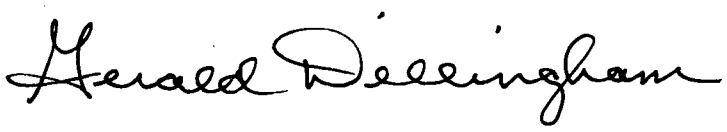
previously found: that any large transformation could take at least 5 to 7 years given the multitude of issues that have to be worked through.[95]

Agency Comments

We provided a draft of this report for review and comment to the Departments of Transportation (DOT) and Defense (DOD). DOT provided technical comments that were incorporated into the report. DOD did not provide any formal comments in response to this report.

We are sending copies of this report to the Secretary of Transportation, the administrator of the FAA, the Secretary of Defense, as well as appropriate congressional committees and other interested parties. In addition this report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff members have any questions about this report, please contact me at (202) 512-2834 or dillinghamg@gao.gov. Contact points for our Offices of congressional relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.



Gerald L. Dillingham, Ph.D.
Director, Physical Infrastructure Issues

[95] GAO, *Results Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*. GAO-03-669. (Washington, D.C.; July 2, 2003).

Appendix I: Objectives, Scope, and Methodology

For this work, we examined (1) selected experts, aviation stakeholders and Federal Aviation Administration (FAA) views on what are the key transition issues to consider if the U.S. air traffic control (ATC) system is moved from FAA to a new entity and their views on these issues, and (2) key lessons that can be learned from other countries' experiences in transitioning responsibility for air traffic control from Civil Aviation Authorities (CAA) to other organizations, and from other experiences in transitioning major government functions in the U.S.

To identify key issues associated with a potential transition of the U.S. ATC system, we examined prior GAO work, talked to GAO subject matter experts and reviewed available literature on restructuring of ATC organizations, and interviewed academics, professionals in the U.S. aviation industry, and officials involved in transitions in other countries.[1] This work identified ATC transition issues related to (1) funding and financing, (2) asset valuation and transfers, (3) separating safety and regulatory functions from ATC operations, (4) managing potential impacts of restructuring to airspace users, (5) human capital, and (6) ATC modernization efforts, as well as other related issues.

To gather opinions from experts about transition issues that should be considered in a restructure, we contracted with the National Academy of Sciences to identify and recruit experts with a wide range of expertise who can speak to the ATC transition issues that we identified. We provided the National Academy of Sciences (National Academy) with criteria for selecting experts, including: (1) type and depth of experience, including the expert's recognition in the professional community and relevance of any published work; (2) present and past employment history and professional affiliations, as well as any potential conflicts of interest; and (3) other experts' recommendations.

The National Academy provided us with a list of 41 possible candidates for our expert interviews. We identified an additional 21 possible interview candidates through our review of literature on ATC reform, and related

[1] The literature we reviewed did not consist of empirical studies, but rather were largely publications describing the transitions of ATCs in other countries. The transition issues that we identified from this body of literature were corroborated by our interviews with experts and stakeholders.

GAO reports.[2] From this group, we then selected 33 experts to interview.[3] Of the 33 experts whom we selected and reached out to interview, one expert declined to be interviewed for this review. Our final expert sample included 32 experts. See table 3 for a list of experts that we interviewed. The views represented by these experts are not generalizable to those of all experts on ATC transition issues; however, we were able to secure the participation of a diverse, highly qualified group of experts and believe their views provide a balanced and informed perspective on the topics discussed.

Table 3: List of Experts Whom GAO Interviewed

Expert	Organization
Craig Fraser	Fitch Ratings, Inc.
Catherine Deluz	Moody's
George Donohue	George Mason University
Bart Elias	Congressional Research Service
Edward Faggen	Metropolitan Washington Airports Authority (Retired)
William Fenton	KPMG (Retired); involved in NAV CANADA ATC restructure
Craig Fuller	The Fuller Company
Richard Golaszewski	GRA, Inc.
David Grizzle	Dazzle Partners, LLC
John Hansman	Massachusetts Institute of Technology

[2] We conducted a literature search for studies that examined issues related to restructuring the U.S. ATC system. Some of the reports that we reviewed included GAO, *Air Traffic Control System: Selected Stakeholders' Perspectives on Operations, Modernization, and Structure*, GAO-14-770 (Washington, D.C.: Sept. 12, 2014); GAO, *Air Traffic Control: Characteristics and Performance of Selected International Air Navigation Service Providers and Lessons Learned from Their Commercialization*, GAO-05-769, (Washington D.C. July 29, 2005); MITRE, *CAA International Structures* (October 2014); and Bart Elias*, CRS, Air Traffic Inc.: Considerations Regarding the Corporatization of Air Traffic Control* CRS Report R43844 (Jan. 5, 2015).

[3] To select our final list of experts to interview, we combined the two lists of the National Academy and GAO identified experts. For each expert, we identified the issue area that different experts would be able to respond to, based on their area of expertise. After categorizing each of the experts, we then selected 5 to 8 experts within each issue area to ensure that our final list of experts represented experts with a balanced set of perspectives. Our final list of experts included 22 experts identified by the National Academy and 11 additional experts identified by GAO.

Expert	Organization
Thomas Hickey	Virginia Railway Express
James Higgins	University of North Dakota
Jeff Holt	Bank of Montreal
Margaret Jenny	RTCA
David John	Brookings Institution
Michael Lexton	RBC Capital Markets
Sid McGuirk	Embry-Riddle Aeronautical University
Donna McLean	Donna McLean Associates, LLC
Clinton Oster	Indiana University
Robert Poole	Reason Foundation
Jack Potter	Metropolitan Washington Airports Authority
John Putnam	Kaplan Kirsch Rockwell
John Samuels	Revenue Variable Engineering, LLC
Jack Schenendorf	Covington & Burling LLP
Michael Scott	Self Employed
David Seltzer	Mercator Advisors, LLC
Jeffrey Shane	International Air Transport Association
James Straker-Nesbit	Lloyd's Market Association
John Strong	College of William and Mary
Oliver Pulcher	Deutsche Flugsicherung GmbH (DFS)
Stephen Welman	MITRE
James Wilding	Metropolitan Washington Airports Authority (Retired)

Source: GAO. | GAO-17-131

We employed a modified version of the Delphi method to collect expert responses. The Delphi method follows a structured process for collecting and distilling knowledge from a group of experts. For our purposes, we conducted two rounds of data collection that included (1) an initial interview and (2) a follow-up web-based survey accessible through a secure server, which allowed for more quantification of the expert's collective views. We took steps in the development of the interview and survey instruments to minimize non-sampling errors by working with a survey specialist in designing the instruments and pre-testing the

instruments.[4] We conducted these pre-tests to ensure that (1) the questions and possible responses were clear and thorough, (2) terminology was used correctly, (3) questions did not place an undue burden on the respondents, (4) the information was feasible to obtain, and (5) the instruments were comprehensive and unbiased. On the basis of the feedback from the pre-tests we conducted, we made changes to the content and format of our two data collection instruments.

For the initial round of interviews, we interviewed the selected 32 experts between November 2015 and February 2016 using a semi-structured interview guide. We identified the issue area(s) that each of the experts would be able to respond to, based on the individual's area of expertise.

We selected 5 to 8 experts within each issue area to ensure that our final list of experts represented experts with a balanced set of perspectives. Based on our categorization, each expert responded to questions in the semi-structured interview guide in which they had specific knowledge and that related to their area of expertise. After these interviews were completed, we conducted a content analysis of the interview data, the results of which we used to develop close-ended survey questions. To complete the content analysis, we organized the interview responses by transition issue area and interview question. We then had one GAO analyst review all of the interview responses to questions in each issue area and identify recurring themes. Using the identified themes, the analyst then developed categories for coding the interview responses and then independently coded the responses for all questions associated with a specific issue area. To ensure the accuracy of our content analysis, we had a second GAO analyst review the first analysts coding of the interview responses and reconcile any discrepancies.

We then asked the experts to complete a web-based survey in which they responded to the survey questions we derived from their responses to the first round of interviews. The survey was conducted between April 5, 2016, and April, 30, 2016, and we received responses from 29 of 32 experts, for a 90.6 percent response rate. (See app. II for a copy of the survey results.) As with our interviews, for the survey, we directed the

[4] We conducted two pre-tests of the semi-structured interview instrument and four pre-tests of the follow-up electronic survey.

experts to only respond to questions about areas in which they had specific knowledge or expertise. As a result, throughout our report, the number of expert responses to survey questions discussed is smaller than 32, the number of experts we interviewed.

To obtain aviation stakeholders' perspectives on these transition issues, we interviewed a judgmentally selected sample of 20 aviation stakeholders. To identify and select aviation stakeholders to interview, we created an initial list of stakeholders using internal knowledge of the aviation industry. We then added more stakeholders based on interviewee responses to our question on whom else they thought we should speak with. Specifically, we wanted to obtain perspectives from individuals and organizations with direct experience, as users of the ATC system, or knowledge, through research or study, of the current ATC system, modernization efforts and FAA's management of the system. We divided aviation stakeholders into the following seven categories: airlines, airports, cargo, general and business aviation, labor unions, manufacturers, and other aviation experts and knowledgeable persons. See table 4 for a list of the individuals and groups we interviewed.

Table 4: List of Aviation Stakeholders That GAO Interviewed

Stakeholder group	Aviation stakeholder
Airlines	Airlines for America (A4A)
	Delta Airlines
Airports	American Association of Airport Executives (AAAE)
	Airports Council International - North America (ACI-NA)
Cargo	Cargo Airline Association
	Regional Air Cargo Carriers Association (RACCA)
General aviation and business	National Business Aviation Association (NBAA)
	National Air Transportation Association (NATA)
	Aircraft Owners and Pilots Association (AOPA)
Labor unions	National Air Traffic Controllers Association (NATCA)
	Airline Pilots Association (ALPA)
	Air Traffic Control Association (ATCA)
	Professional Aviation Safety Specialists (PASS)
Manufacturers	Aerospace Industries Association (AIA)
	General Aviation Manufactures Association (GAMA)
	Harris Corporation
	Helicopters Association (HAI)

Stakeholder group	Aviation stakeholder
Other aviation experts, knowledgeable persons and relevant organizations	Charlie Keegan
	Russ Chew
	Monte Belger
	Bobby Sturgell

Source: GAO. | GAO-17-131

We used a semi-structured interview format with 7 open-ended questions to obtain aviation stakeholder's perspectives on a range of potential transition issues. Because our questions were open-ended questions, not all of the aviation stakeholders raised or commented on the same transition issues. As such, when we report that 10 stakeholders raised a specific issue, this does not necessarily mean that the remaining 11 stakeholders we interviewed disagreed. Rather, it means that those stakeholders did not raise it during the course of our interview. We analyzed the responses to these open-ended questions to identify the main themes raised by stakeholders through a content analysis of the response. To complete the content analysis, we had one GAO analyst review the interview responses and identify recurring themes. Using the identified themes, the analyst then developed categories for coding the interview responses and then independently coded the responses to a specific set of questions. To ensure the accuracy of our content analysis, we had a second GAO analyst review the first analysts coding of the interview responses and reconcile any discrepancies. To obtain FAA views we interviewed the Administrator and Deputy Administrator and obtained responses for detailed questions from the following offices: Aviation Safety, Air Traffic Organization, Policy, International Affairs and Environment Office, Finance and Management, and Human Capital. We also obtained relevant documentation on FAA and the ATC system from FAA. We also obtained information from Department of Defense (DOD) on issues DOD would consider relevant to a transition.

To identify key lessons learned from other countries' experiences in transitioning responsibility for air traffic control from CAAs to other organizations, we reviewed literature and documentation describing ATC transition efforts in Canada, New Zealand, and the United Kingdom (UK) and interviewed officials knowledgeable about the ATC restructuring in these countries. We selected these countries on the basis of an assessment of the following criteria: (1) date of transition; (2) the governance structure of the ANSP; (3) extent to which the ATC transition has been cited frequently as a model for a potential U. S. restructure; (4) availability of information and experts knowledgeable about the ATC

restructuring; and (5) ease of organizing interviews or site visits to the specific location. For each country, we interviewed and reviewed documentation from the following entities: (1) ANSP; (2) Civil Aviation Authority; (3) Air Traffic Control Association; (4) Union associations and/or representatives; (5) associations and organizations representing other aviation users (i. e., general and business aviation, airports, etc.); and 6) other entities, such as auditing agencies, academics, or international aviation organizations located in the region that are knowledgeable about the ATC restructuring. See table 5 for a list of entities that we interviewed.

We conducted one site visit to Canada in October 2015 to interview officials in person. Our interviews with officials involved in ATC transition efforts in New Zealand[5] and the UK were conducted over the phone. Through our interviews and literature review we obtained information on lessons learned from these countries' ATC restructurings; transition challenges, if any, faced in these ATC restructurings and actions taken to mitigate these challenges; length and time it took it took for transitions to be completed; general costs to government of transitions; and information on other transition issues. Lessons learned from these ATC restructurings are meant to be illustrative and are not generalizable to all ATC restructurings.

Table 5: GAO's Interviews with Organizations and Officials Knowledgeable of Air Traffic Control Restructurings in Other Countries

Foreign air navigation service provider	Organizations and experts
Organizations and experts with knowledge about the NAV CANADA Restructuring	AviaSolutions[a]
	Air Line Pilots Association – International (ALPA), Canadian members
	Air Transport Association of Canada (ATAC)
	Canadian Air Traffic Controllers Association (CATCA)
	Canadian Owners and Pilots Association (COPA)

[5] As shown in table 3 we interviewed one official regarding New Zealand's restructuring experiences. Since New Zealand restructured its ATC system in 1987, we were only able to find one official who had experience with the change. In addition to the interview we relied on documentation of the restructuring.

Foreign air navigation service provider	Organizations and experts
	Royal Bank of Canada
	Transport Canada
	NAV CANADA
	Glen McDougall, former Director General with the Government of Canada
Organizations and experts with knowledge about the UK NATS restructuring	United Kingdom National Air Traffic Services Ltd (UK NATS)
	Barry Humphreys, The Airline Group, UK NATS, British Air Transport Association
	David Luxton, National Secretary, Prospect (UK union)
	Douglas Andrew, former Economic Regulator, UK Civil Aviation Authority
	Richard Everitt, former CEO, UK NATS
	Robin Morris, former Chair, NATS Trades Union
Organizations and experts with knowledge about the New Zealand ATC restructuring	Ed Sims, CEO, Airways New Zealand

Source: GAO. | GAO-17-131

[a]AviaSolutions staff were involved in various capacities in the privatization of UK NATS and the development of the funding and financing structure for both NAV CANADA and UK NATS. As such, we interviewed them about their involvement in both ATC restructurings.

We conducted this performance audit from June 2015 to October 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Expert Survey and Responses

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
441 G St. N.W.
Washington, DC 20548

The Ranking Members of the House Committee on Transportation and Infrastructure and its Subcommittee on Aviation have asked the Government Accountability Office (GAO) to conduct a review of potential transition issues that might arise if the U.S. were to restructure its air traffic control governance from the current structure to an alternative structure. As part of this review, GAO is sending this survey to recognized experts on issues related to this topic. Please answer the questions based on your individual experience and point of view. Answering these questions will help us inform Congress about this important topic

Responding to these questions should take about 30-60 minutes and can be completed over multiple sessions. Your responses can be saved and accessed at a later date. To learn more about completing the survey, printing your responses, and whom to contact if you have questions, please contact GAO. If you are unsure of how to respond to a question, please contact us for assistance.

Definitions:

- Throughout the survey we use the term new air traffic control (ATC) entity to refer to an entity that would be responsible for managing air traffic operations if the U.S. were to separate ATC operations from safety regulatory functions. In other countries, the ATC entity is often referred to as the air navigation service provider (ANSP).

- In addition, we use the term safety regulator to refer to the entity that would be responsible for the safety and oversight of the U.S. airspace system if the U.S. were to separate ATC operations from safety regulatory functions.

Section 1: Funding Issues *(5 questions)*

The questions in this section are about funding issues, such as:

- User fees (i.e., fees charged to aircraft and other airspace users to cover the costs of the air navigation services) and other charges,
- Monopoly oversight issues, and
- Funding mechanisms in times of funding shortages.

N=18

1. **Do you think user fees should fund the ATC system?**
   20 Yes (*if yes, continue to question 1a*)
   12 No (*if no, continue to question 1d*)

   a. **Do you think that a "weight and distance" user fee system, structured as recommended by ICAO charging principles (i.e., cost-based user fees where the charge for each flight is based on distance flown—which acts as a proxy for costs incurred by an ANSP in providing services to a flight—and aircraft weight—which acts as a proxy for the value of the service provided to the**

user—for each flight) would be an appropriate user fee system for a restructured ATC?

17 Yes (*if yes, continue to question 1b*)

☐ No (*if no, continue to question 1c*)

b. How much of a benefit would a system of user fees structured as recommended by ICAO charging principles, be in the following respects? *(check one answer per row)*

	Great benefit	Moderate benefit	Little or no benefit	Don't know
a. Provides a reliable stream of funding	16	1	-	-
b. Provides the globally accepted form of funding	9	6	1	1
c. Can be designed to cover all costs of the ATC (e.g., operations, research and development, and NextGen)	15	2	-	-
d. Is transparent and will enable users to understand how they are being charged	15	2	-	-
e. Will allocate more costs to users with greater ability to pay	8	7	2	-
f. Provides a more business-like relationship between ATC and user community than current system	14	2	1	-
g. Assigns charges to costs imposed by users	8	7	1	-
h. Other: _____	6	1	-	-

c. If not, describe what other option(s) are available for structuring a user-fee system and what benefits are associated with each alternative option(s)?

Responses not included

d. Please explain below why you do not think that user fees should fund the ATC system.

Responses not included

2. **What fee, if any, should the following user groups be required to pay?** (*Check one answer per row).*

	Pay a weight and distance user fee	Pay a flat fee	Pay a fee that is not weight and distance based or a flat fee	Exempt from paying any direct user fee	Don't know	Other
a. Airlines	**17**	**-**	**-**	**-**	**-**	**1**
b. General aviation	**3**	**10**	**2**	**1**	**-**	**2**
c. Business aviation	**15**	**1**	**-**	**-**	**-**	**2**
d. Cargo aviation	**17**	**-**	**-**	**-**	**-**	**1**
e. U.S. military	**4**	**2**	**-**	**8**	**3**	**1**
f. Federal law enforcement	**3**	**1**	**1**	**9**	**2**	**1**
g. Homeland security	**4**	**1**	**1**	**9**	**-**	**-**
h. State and local government	5	1	1	8	2	1
i. Other:_____	-	2	-	1	-	1

a. **For each user group that you think should pay a flat fee, please explain why you think that's the case.**

Response not included

b. **For each user group that you think should pay a fee that is not weight and distance based or a flat fee, please explain why you think that's the case.**

Response not included

c. **For each user group that you think should be exempt from paying any direct user fee, please explain why you think that's the case.**

Response not included

3. **If the new ATC entity has one of the following governance models, would an economic regulator be needed to ensure that the ATC entity does not charge excessively high rates?** *(check one answer per row)*

	Yes, an economic regulator would be needed	No, an economic regulator would not be needed	Maybe	Don't Know
a. Non-profit entity with a board of directors made up of user groups	6	11	1	-
b. For profit entity	16	-	2	-
c. Partially government-owned entity	8	3	7	-
d. Fully government-owned entity	6	8	4	-
e. Other:_____	-	-	-	1

4. **How effective are the following funding mechanisms at addressing the effect of revenue volatility on the ATC's financial situation that might ensue due to such events as recessions, global incidents, or communicable diseases?**

	Very effective	Moderately effective	Little or Not at All effective	Don't Know	No answer
a. If the new ATC entity's financial structure includes debt financing, ensuring that the financial structure is not overly reliant on debt financing (i.e., overly leveraged)	9	5	3	-	1
b. Establishing a reserve fund through user fees, with appropriate levels of reserves to manage revenue instability	15	2	-	-	1
c. Establishing access to credit to tap into during periods of reduced revenues	7	8	2	-	1
d. Establishing a mechanism built into the funding structure such that if revenues fall below certain thresholds fees are automatically increased.	6	6	5	-	1
e. Providing the ATC with the flexibility to change rates as needed	10	7	-	-	1
e. Other: _____	1	1	-	-	2

Section 2: Asset transfers and valuation methods *(2 questions)*
N=19

The questions in this section are about asset transfers and valuation methods.

5. Do you think that the federal government should receive payment for the ATC system?

2 Yes (*continue to question 6b*)
7 Yes, but depends on the governance model (*continue to question 6a)*
8 No (*continue to question 6c)*

a. For which of the following governance models, should the federal government receive payment for the ATC system? *(continue to question 6b)*

	Yes	No	Don't know
a. Non-profit entity	4	2	1
b. For profit entity	7	-	-
c. Partially government-owned entity	4	2	1
d. Fully government-owned entity	-	7	-
e. Other:_____	1	-	-

b. Please explain why you think that the federal government should receive payment for the ATC system *(continue to question 7)*

Response not included

c. During our interviews with experts, some experts expressed reasons that they did not think the U.S. government should receive payment for the assets transferred to the new ATC entity. Do you agree or disagree with the following reason for not having such a payment?

	Agree	Disagree	Don't know
a. Much of the ATC system and assets have already been paid for by users through ticket and fuel taxes.	8	-	-
b. Paying for the system might impose a significant financial burden on the new ATC entity impacting its financial stability.	7	1	-
c. Payment would raise the level of financing needed and potentially have a significant impact on the level of user fees.	8	-	-
d. Determining a price for the ATC system	7	1	-

and assets would be a time-consuming, complex and expensive undertaking.			
e. Other: _____	5	-	-

6. **If there is to be payment of the ATC system, what method should be used to value it?** *(check one option)*

4 Going concern -- the market value of an entity is an estimate of its expected future discounted cash flows across the ATC entity as a whole.

1 Net book value --- the net book value of the entity's assets minus the value of its liabilities and intangible assets, that is, how much the entity would be worth if it paid all its debts and liquidated.

7 A combination of market value and net book value of the assets in which assets such as land, real estate or other property that could have an alternative use are appraised at their market value and assets that are particular to ATC use are valued at net book value.

5 Other: _____

☐ Don't know: _____

Section 3: Separation of safety oversight and regulatory functions *(7 questions)*

The questions in this section are about the assignment of certain current FAA activities to separate entities. An example of such would be assignment of safety, oversight, and regulatory functions to one entity and of operations and acquisition functions to another.

N=14

7. **If safety oversight and regulatory functions remain with the federal government, what current FAA activities should remain the responsibility of the safety regulator, new ATC entity, both the new ATC entity and safety regulator, or another entity?**

	Safety regulator	New ATC entity	Both the new ATC entity and safety regulator	Another entity	Don't Know
a. Aviation safety oversight and regulatory functions (for example, development of safety performance standards, certification of new air operators, aircraft, and aircraft parts and equipment; airworthiness	13	-	-	-	-

activities; and rule-making process).					
b. Other safety functions that are currently within ATO (for example, ATC oversight, certification of controllers, monitoring and re-training staff, review of internal safety controls).	1	4	8	-	-
c. Development of flight standards such as new performance based-navigation procedures	2	5	6	-	-
c. Approval of flight standards such as new performance based-navigation procedures	8	2	3	-	-
e. Administration of the Airport Improvement Program (AIP)	8	-	-	5	-
f. Environmental responsibilities such as ensuring compliance under the National Environmental Policy Act (NEPA)	4	2	5	2	-
g. Research and development activities including activities undertaken at research facilities	3	5	5	-	-
h. Commercial space activities (for example, licensing, reviewing safety approvals, commercial space rulemaking activities, and promoting commercial space launch industry)	10	-	2	1	-
i. Flight surgeon reviews and issuance of pilot medical certificates, development of medical policies and medical certification procedures	11	-	2	-	-
j. Non-National Transportation Safety board accident investigation activities	10	-	2	1	-
k. NextGen global harmonization efforts including coordination with international stakeholders at ICAO and other venues	1	3	8	-	-
l. Other: _____	-	2	1	-	-

If you selected, 'another entity' for any of the functions listed in question 7, please specify what other entity you think should take on responsibility of the function(s).

Response not included

8. **In your opinion, if the U.S. were to separate safety functions from ATC operations, how easy or difficult would it be to delineate roles and responsibilities between the safety regulator and new ATC entity?**

   1 Very easy
   5 Moderately easy
   1 Neither easy nor difficult
   4 Moderately difficult
   2 Very difficult
   ☐ Don't know

9. **If the U.S. were to separate safety regulatory functions from ATC operations, how positive or negative of an impact do you think such a separation would have on the safety regulator?**

	A large negative impact	A small negative impact	No impact	A small positive impact	A large positive impact	Don't know
a. Staffing Levels	3	4	3	-	3	-
b. Funding	4	3	3	1	2	-
c. Staff expertise	3	4	2	1	3	-
d. Workload	3	3	4	2	1	-
e. FAA certification process	1	5	3	2	2	-
f. FAA rulemaking process	1	5	3	2	2	-
g. Other:_____	1	1	-	-	-	-

10. **How necessary would the following changes be to ensuring that FAA is an effective safety regulator?**

	Very necessary	Somewhat necessary	Slightly necessary	Not necessary	Don't know or No answer?
a. Streamlined process for approving performance	6	4	1	1	1

based procedures					
b. Streamlined ATC rulemaking process (such as improved timeliness of rulemaking)	5	5	2	-	1
c. Streamlined certification processes of air carriers, aircraft, and aircraft parts and equipment	5	4	2	1	1
d. Improved flexibility and adaptability of FAA's organizational culture	8	4	-	-	1
e. Additional staff resources	3	4	4	1	1
f. Additional funding than what FAA's Aviation Safety Office currently receives	4	3	3	2	1
g. More stable source of funding that what is currently in place	6	3	4	-	-
h. Improved recruitment process to increase expertise	3	8	1	-	1
i. Other_____ _____	1	-	-	-	2

If you have any comments about question 10, please write them below:

Response not included

11. How important is it to ensure there is communication and collaboration between the safety regulator and the new ATC entity on the following activities?

	Very important	Moderately important	Slightly or Not at all important	Don't know
a. NextGen implementation	10	3	-	-
b. Sharing safety data	12	1	-	-
c. Rulemaking process	8	5	-	-

d. Air operators, aircraft, and aircraft parts and equipment certification processes	5	5	3	-
e. Developing flight procedures	12	1	-	-
f. Developing ATC procedures	11	2	-	-
g. Technical operations and other ATC functions	7	3	3	-
h. NextGen global harmonization efforts	6	6	1	-
i. Other:_____	-	-	-	-

12. In your opinion, if a restructure were to occur, how would communication and collaboration between the safety regulator and the new ATC entity on the following activities be impacted?

	A large negative impact	A small negative impact	No impact	A small positive impact	A large positive impact	Don't know/no answer
a. NextGen implementation	2	3	1	3	3	1
b. Sharing safety data	1	2	3	4	2	1
c. Rulemaking process	1	3	3	2	2	1
d. Air operators, aircraft, and aircraft parts and equipment certification processes	1	3	4	4	-	1
e. Developing flight procedures	2	3	2	3	2	1
f. Developing ATC procedures	2	3	2	3	2	1
g. Technical operations and other ATC functions	1	3	3	2	3	1
h. NextGen global harmonization efforts	1	1	6	2	1	1
i. Other: _____	-	-	-	-	-	2

13. In your opinion, how, if at all, would separating ATC operations from the safety regulator affect the organizational culture of the safety regulator?

4 a large positive effect
4 A small Positive effect
2 no effect
1 a small Negative effect

2 a large negative effect
☐ Don't know

Section 4: Managing impacts *(1 question)*
N=14
The questions in this section are about potential access impacts of an ATC restructure on these various airspace users.

14. In your opinion, should the following actions be taken to help mitigate potential access impacts to users?

	Yes	No	Don't know
a. prohibits closure of certain ATC facilities (e.g. ATC facilities in small communities or rural areas)	-	11	-
b. specifies criteria that must be met for closing certain ATC facilities (e.g. ATC facilities in small communities or rural areas)	8	3	-
c. prohibits closure of contract towers (e.g., contract towers in small communities or rural areas)	-	11	-
d. specifies criteria that must be met for closing contract towers (e.g., contract towers in small communities or rural areas)	8	3	-
e. Creation of a board of directors with representation from a broad, inclusive set of stakeholders	10	1	-
f. Other _____	1	1	-

Section 5: Human Capital *(5 questions)*
N=11

The questions in this section are about human capital issues, such as issues related to

- hiring and retention,
- union issues,
- employee benefits (e.g., pay, pension, healthcare),
- retirement (e.g., early retirement and mandatory retirement), and
- other human capital issues that may arise during a restructure.

15. If the U.S. were to separate safety regulatory functions from ATC operations, in your opinion, will it be more difficult, about the same or less difficult for the new safety regulator to hire and retain skilled staff?

2 More difficult
6 About the same
3 Less difficult
☐ Don't know

16. How important is it that the following benefits are maintained for federal employees who transfer from FAA to the new ATC entity?

	Very important	Moderately important	Slightly or not important at all	Don't know
a. Healthcare	7	2	2	-
b. Pension	8	-	1	-
c. TSP/401K	7	1	1	-
d. Union agreements	5	3	2	-
e. Seniority preferences or benefits (e.g., work schedule preferences and geographic location)	4	4	2	-
f. Other:_____	3	1	-	-

If you have any comments about question 16, please write them below:

Response not included

17. Do you think the new ATC entity employees should be able to strike?

1 Yes
9 No
☐ Don't Know

18. In your opinion, how important is it to make decisions and communicate to existing staff early on in the transition process the following details related to how personnel would be transferred to the new ATC entity?

	Very important	Moderately important	Slightly or not important at all	Don't Know
a. Decide early on which staff position will be transferred to the new ATC entity.	9	2	-	-
b. Communicate information about which staff positions will be transferred to the new ATC entity.	10	1	-	-
c. Develop a process for transferring staff.	10	1	-	-
d. Communicate information about the process for transferring staff.	10	1	-	-

e. Communicate information about whether staff will maintain an equivalent position in the new ATC entity.	9	1	1	-
d. Other:_____	1	-	-	-

If you have any comments about question 18, please write them below:

Response not included

Section 6: NextGen and Other Issues *(2 questions)*
N=16

19. In your opinion, would there be a positive or negative impact on the following NextGen elements if there was an ATC restructure?

	A large negative impact	A small negative impact	No impact	A small positive impact	A large positive impact	Don't know
a. Meeting NextGen implementation timelines and commitments	1	2	1	5	7	-
b. Ability to collaborate with industry on NextGen issues	-	1	1	2	12	-
c. Coordination between the new ATC entity and safety regulator on NextGen implementation	1	4	2	5	3	1
d. Coordination between the new ATC entity and safety regulator on development of new ATC procedures related to NextGen	1	2	2	5	5	1

e. Funding for NextGen	-	1	3	4	7	1
f. Other:_____	-	-	-	-	2	-

20. In your opinion, in an ATC restructure, should the following be associated with the new ATC entity, the safety regulator or another entity?

	New ATC entity	Safety regulator	Both the new ATC entity and the safety regulator	Another entity	Don't know
a. FAA Aeronautical Center in Oklahoma City	5	2	7	-	2
b. Technical Center in Atlantic City	9	1	4	-	2
c. Regional offices	2	11	1	-	2
d. Service area offices	4	6	3	-	2
e. Commercial space office	1	9	2	2	2
f. Unmanned Aircraft Systems (UAS) office	1	10	2	1	1
g. Other: _____	-	-	-	-	-

If you selected, either 'another entity' or 'don't know' in question 21, please explain:

Response not included

Section 7: Governance/Representation *(1 questions)*
N=32

21. If the new ATC entity has a board of directors, should the following groups be included on the board of directors?

	Yes	No	Don't know
a. Airline consumers	13	14	2
b. Airlines (major and regional airlines)	28	1	-
c. Unions	22	6	1
d. Airports	23	5	-
e. Unmanned Aircraft Systems (UAS) industry	11	15	2
d. General Aviation	27	2	-

e. Business Aviation	25	3	1
f. Cargo	24	3	1
g. U.S. military	14	9	3
h. Federal law enforcement	3	22	2
i. Homeland security	7	18	2
j. State and local government	5	22	-
k. Other:_____	6	2	1

Closing Questions *(3 questions)*

22. In your opinion, approximately how much time would be needed to legislate, negotiate, plan and implement an ATC restructure?

	1 year	2 years	3 years	4 years	5 years or more	Don't know
a. Legislate	15	7	4	1	-	2
b. Negotiate	12	11	2	1	1	2
c. Plan	10	7	7	2	1	2
d. Implement	4	10	3	5	6	1

***23.* In your opinion, how challenging would it be to resolve the following issues?** *(choose one response per row)*

	Very challenging	Moderately challenging	Slightly or not at all challenging	Don't know
a. Determining how the funding of the new ATC entity should be structured.	13	11	5	-
b. Determining how assets are valued and transferred.	5	14	10	-
c. Separating current FAA safety and regulatory functions from the new ATC entity.	4	16	8	-
d. Managing potential impacts to airspace users resulting from creating a new ATC entity separate from the safety regulator.	4	12	13	-
e. Managing human capital transition issues.	10	15	4	-
f. Ensuring an adequate amount of time to plan and implement a transition.	9	17	3	-
g. Mitigating impacts to current FAA initiatives (for example,	7	14	7	1

NextGen implementation and UAS integration).				
h. Other _____	4	1	-	1

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

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