



Testimony

Before the Subcommittee on Aviation,
Committee on Transportation and
Infrastructure, House of
Representatives

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FAA REAUTHORIZATION ACT

Progress and Challenges Implementing Various Provisions of the 2012 Act

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Physical Infrastructure Issues

GAO Highlights

Highlights of [GAO-14-285T](#), a testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives

Why GAO Did This Study

The U.S. air transportation system is the busiest and among the safest in the world. Even so, maintaining and improving the extraordinary level of connectivity and mobility the system affords us, and the safety record that has been achieved to date requires continued attention and effort. In the 2012 Act, Congress directed FAA to take various actions to improve the safety and efficiency of the current NAS while transitioning to NextGen. In addition, given the potential and opportunities afforded by new UAS technologies, the 2012 Act included several provisions with respect to FAA safely integrating UAS into the NAS.

Based on work GAO has conducted for this Committee since the passage of the 2012 Act, this testimony discusses FAA's challenges and progress in

- 1) implementing NextGen,
- 2) improving aviation safety, and
- 3) integrating UAS into the national airspace system.

This statement is drawn from several GAO reports completed since the 2012 Act, as well as additional reports from prior to the 2012 Act on these topics. To update information in those reports, GAO conducted interviews with officials from FAA and industry, and reviewed agency documents.

View [GAO-14-285T](#). For more information, contact Gerald L. Dillingham at (202) 512-2834 or dillinghamg@gao.gov.

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What GAO Found

The FAA Modernization and Reform Act of 2012 (the 2012 Act) contained several provisions related to implementing the Next Generation Air Transportation System (NextGen)—a complex, long-term initiative to incrementally modernize and transform the national airspace system (NAS). GAO's recent work on NextGen has highlighted three key implementation issues:

- *Improving NextGen Leadership:* Complex transformations, such as NextGen, require substantial leadership commitment over a sustained period, and leaders must both be empowered to make critical decisions and be held accountable for results. The 2012 Act created a Chief NextGen Officer that FAA appointed in June 2013, and FAA has recently filled other key NextGen leadership positions. With these positions filled, FAA should be in a better position to resolve its NextGen leadership challenges.
- *Demonstrating Near-Term Benefits:* The 2012 Act included a number of provisions aimed at accelerating the creation of performance-based navigation (PBN) procedures, such as following precise routes that use the Global Positioning System, which can save airlines and other aircraft operators money through reduced fuel burn and flight time. FAA must continue to deliver PBN capabilities and begin to demonstrate a return on operator's investments. As of January 2014, FAA has implemented PBN procedures at two of the five airports selected for early deployment.
- *Balancing the Needs of the Current Air-Traffic Control System and NextGen:* While the 2012 Act contained a number of provisions aimed at accelerating NextGen implementation, GAO found that FAA's budget planning does not fully account for the impact on the agency's operating costs of the NextGen systems that will be deployed in future years, along with the need for continued operation and maintenance of existing systems and facilities. Cost estimates for maintaining existing systems and facilities coupled with implementing NextGen exceed anticipated funding levels. GAO recommended improvements to FAA's budget-planning and infrastructure-condition data, which FAA is working to implement.

Safety in the aviation industry is achieved in part through adherence to various certification standards. The 2012 Act required FAA to work with industry to assess the certification process. GAO's work has found that while FAA has made progress developing its plan to implement these recommendations, FAA continues to lack performance measures to track its progress.

For unmanned aircraft systems (UAS), FAA has implemented 7 of the 17 requirements established in the 2012 Act, representing progress since GAO's last update in January 2013. However, FAA continues to experience challenges implementing the provisions in the 2012 Act and integrating UAS into the NAS. For example, although FAA has had efforts under way since 2008 supporting a rulemaking on small UAS, it is unlikely that FAA will meet the August 2014 final rule deadline required by the 2012 Act since it has not yet issued a Notice of Proposed Rulemaking. In addition, while FAA created the UAS Integration Office in 2013 to lead UAS integration, as of January 2014, the program lacks an operations budget.

Chairman LoBiondo, Ranking Member Larsen, and Members of the Subcommittee:

I appreciate the opportunity to testify today on progress made by the Federal Aviation Administration (FAA) in implementing key provisions of the FAA Modernization and Reform Act (the 2012 Act).¹ The U.S. air transportation system is the busiest and among the safest in the world, with key aviation stakeholders—FAA, the airlines and other aircraft operators, airports, aircraft manufacturers, and others—working together to achieve these results. Nevertheless, FAA must not become complacent because of the extraordinary level of connectivity and mobility the system affords us, or the safety record that has been achieved to date. Thus, in the 2012 Act, the Congress directed FAA to take various actions to improve the safety and efficiency of the current air traffic control (ATC) system while transitioning to the Next Generation Air Transportation System (NextGen).² In addition, given the potential opportunities afforded by new unmanned aircraft systems (UAS), the 2012 Act included several provisions with respect to FAA safely integrating UAS into the national airspace system (NAS). Ongoing improvements to safety, implementation of NextGen, and integration of UAS continue to be paramount as Congress considers FAA's progress to date, and begins to consider the next reauthorization bill.

My statement today is based on work on these issues we have completed for the Subcommittee since passage of the 2012 Act, including (1) implementing NextGen, (2) improving aviation safety, particularly with respect to implementing provisions of the 2012 Act related to FAA's certification processes, and (3) integrating UAS into the NAS. The 2012 Act also directed us to complete eight studies on a variety of aviation topics. Appendix II lists seven of those mandated studies that have been completed and contains information on our key findings.³

¹Pub. L. No. 112-95, 126 Stat. 11 (2012).

²The objective of the NextGen initiative is to transform the current radar-based system to one centered on satellite-based navigation, automated position reporting, and digital communications. See appendix I for a listing of recent GAO reports related to NextGen, among others.

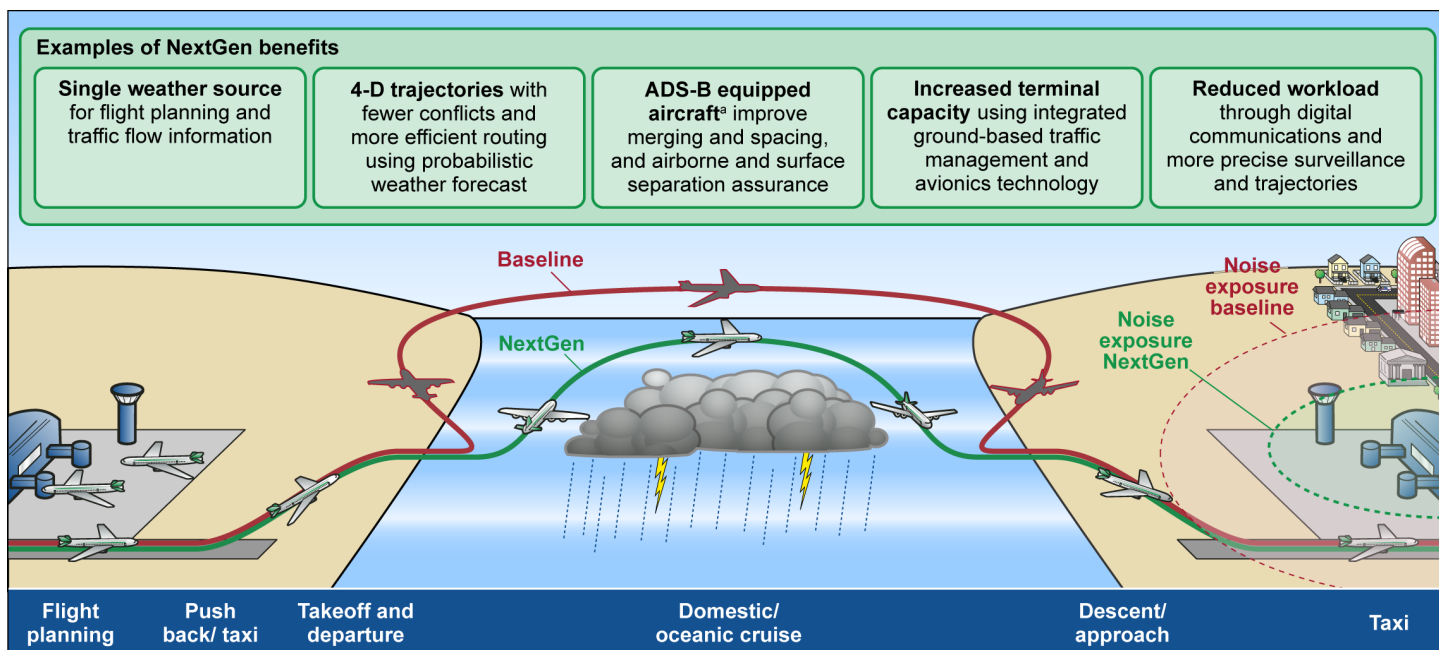
³Section 808 of the 2012 Act mandated that GAO perform a study and report to Congress on the impact of increases in aviation fuel prices on the Airport and Airway Trust Fund and the aviation industry in general. A final report will be issued in spring 2014.

This statement is drawn from several reports that we completed since passage of the 2012 Act, as well as additional reports from prior to the Act on these topics. We have updated this information through a review of FAA documents and interviews with FAA officials, as well as interviews with relevant advisory groups. In addition to the information on the seven completed studies mandated in the 2012 Act listed in appendix II, a list of other related GAO products is included in appendix I of this statement, along with footnoted references to these products throughout the statement. We reviewed and analyzed documents and interviewed relevant government, academic, and private-sector entities to address these objectives. The reports and testimonies cited in this statement contain more detailed explanations of the methods used to conduct our work. The work upon which this testimony is based on was conducted 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.

FAA Faces Several Challenges Implementing NextGen

More than 10 years ago, Congress directed FAA to conceptualize and plan NextGen; FAA is now implementing key NextGen systems and capabilities. NextGen was envisioned as a major redesign of the air transportation system to increase efficiency, enhance safety, and reduce flight delays that would entail precision satellite navigation and surveillance; digital, networked communications; an integrated weather system; and more. Figure 1 provides examples of changes and benefits that are expected to come from NextGen.

Figure 1: Examples of NextGen Changes and Benefits



Source: GAO.

Notes: The baseline reflects an aircraft's flight path in the current air-traffic control system.

"Four-dimensional (4-D) trajectory" operations is an air traffic management concept in which every aircraft that is operating in or managed by the air traffic control system is represented in four dimensions—latitude, longitude, altitude, and with time.

^aAutomatic Dependent Surveillance-Broadcast (ADS-B) is a technology that will enable 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.

The transition to NextGen—which encompasses multiple programs, procedures, and systems at different levels of maturity—is a complex, incremental, multi-year process. Since 2006, we have monitored FAA's development of NextGen and identified a number of key challenges facing the agency's implementation efforts. The 2012 Act included several provisions that address some of the issues that we have identified in our work, including incentivizing aircraft operators to equip with NextGen technologies, developing performance measures, and involving stakeholders in NextGen development.⁴ Our recent work on FAA's progress in implementing NextGen has highlighted ongoing challenges in

⁴For provisions related to NextGen, see 2012 Act, §§ 201-225, 126 Stat., 36-56.

three areas: improving leadership, demonstrating near-term benefits, and balancing the needs of the current system while implementing NextGen systems.

Improving NextGen Leadership

Our work has found that complex organizational transformations, such as NextGen, involving technology, systems, and retraining key personnel require substantial leadership commitment over a sustained period, and that leaders must be empowered to make critical decisions and held accountable for results. Transitions, inconsistent leadership, and unclear roles and responsibilities can weaken the effectiveness of the internal and external collaboration required for successful implementation. Both the magnitude of the multi-year transition, as well as the numerous efforts under way throughout the different offices and divisions in FAA to effectuate that transition, will require FAA's leaders to manage all aspects of NextGen in a strategic, timely, and coordinated fashion.

FAA has struggled to have the leadership in place to manage and oversee NextGen implementation,⁵ but more recently, has begun to fill key positions. In June 2013, FAA appointed a new Deputy Administrator and designated a Chief NextGen Officer, in response to Section 204 of the 2012 Act.⁶ In addition, in September 2013, FAA appointed a new Assistant Administrator for NextGen—a position that had previously been vacant. Designating one leader—such as the Deputy Administrator's responsibility over NextGen—can be beneficial because it centralizes accountability and can speed decision-making. With these positions now filled, FAA should be in a better position to resolve its NextGen leadership challenges. However, as I have stated in other work, a number of offices oversee certain aspects of NextGen, not all of which report to the Assistant Administrator, and implementation will require successful collaboration between these offices. As these positions have only recently been filled, it is not yet clear how effective the changes resulting from the 2012 Act will be in achieving that collaboration.

⁵See GAO, *NextGen Air Transportation System: FAA Has Made Some Progress in Midterm Implementation, but Ongoing Challenges Limit Expected Benefits*, [GAO-13-264](#) (Washington, D.C. April 2013); and GAO, *National Airspace System: Improved Budgeting Could Help FAA Better Determine Future Operations and Maintenance Priorities*, [GAO-13-693](#) (Washington, D.C. Aug. 2013).

⁶2012 Act, § 204, 126 Stat., 37.

Another key development in NextGen management envisioned by Section 208 of the 2012 Act⁷ redesignated the Director of the Joint Planning and Development Office (JPDO) as an Associate Administrator reporting directly to the FAA Administrator and defined that administrator's responsibility for coordination and planning with FAA's partner agencies.⁸ This change has not been fully implemented by FAA. However, in the Consolidated Appropriations Act of 2014, Congress eliminated direct funding of JPDO, and subsumed JPDO in FAA's operations budget. At this point, it remains unclear whether a JPDO Director position will continue and, if not, how the roles and responsibilities of that office, particularly with respect to long-term planning and coordination of research and development efforts across partner agencies, will be redistributed within FAA. We will continue to monitor these issues in two studies requested by this committee—one examining the organizational and leadership structure of the NextGen effort, and one looking more in-depth at actions FAA has taken to streamline its organization. We have begun both of these examinations.

Demonstrating Near-Term Benefits

To convince operators to make investments in NextGen equipment, FAA must continue to deliver systems, procedures, and capabilities that demonstrate near-term benefits and a return on an operator's investments. In particular, a large percentage of the current U.S. air carrier fleet is equipped to fly more precise performance-based navigation (PBN) procedures, such as following precise routes that use the Global Positioning System or glide descent paths, which can save airlines and other aircraft operators money through reduced fuel burn and flight time.⁹ However, aircraft operators have expressed concerns that FAA has been slow to produce new procedures for various reasons, and has not produced the most useful or beneficial PBN routes and procedures.

⁷2012 Act, § 208, 126 Stat., 40.

⁸FAA's partner agencies in the NextGen effort include the Departments of Commerce (particularly its National Oceanic and Atmospheric Administration (NOAA)), Defense (DOD), and Homeland Security (DHS); the National Aeronautics and Space Administration (NASA); and the White House Office of Science and Technology Policy (OSTP).

⁹PBN uses advance guidance technology to improve the precision of air-traffic control routes (known as "procedures"). These procedures can deliver benefits to airlines such as fuel savings and increased efficiency, particularly in congested airspace.

The 2012 Act included a number of provisions aimed at accelerating the creation of PBN procedures. For example, Section 213 of the 2012 Act¹⁰ directed FAA to develop plans to identify beneficial PBN procedures and to prioritize their implementation at key airports. We reported in April of 2013 that FAA had made progress in focusing its PBN efforts at seven priority metroplexes with airport operations that have a large effect on the overall efficiency of the NAS.¹¹ More recently, FAA reports that it is considering recommendations from the NextGen Advisory Committee (NAC) regarding revalidation of the criteria used to prioritize these metroplexes, and that recent efforts have been diverted to metroplexes where the deployment of the new En Route Automation Management (ERAM) system is complete, in order not to interfere with ERAM deployment at those locations where it is ongoing.

Our work also found that FAA does not have a system for tracking the use of existing PBN procedures. As a result, FAA is unable to assure that investment in these routes is worthwhile or that they justify the cost to develop and maintain them. Further, in the absence of data on the use of existing PBN routes, airlines and other stakeholders remain unconvinced that the investments needed for the full implementation of NextGen will be justified. Such data could help the agency demonstrate the value of PBN technologies and any resulting benefits, as well as allow the agency to identify routes that need to be revised to increase their use. We made recommendations to FAA to develop a system to track the use of PBN procedures and a process to proactively identify new PBN procedures based on NextGen goals and targets. We will continue to monitor FAA's progress in implementing these recommendations.

The 2012 Act also included two other key provisions to accelerate the creation of PBN procedures. The first was a categorical exclusion from environmental review for PBN procedures that if implemented could demonstrate measurable reductions in fuel consumption, carbon dioxide emissions, and noise, on a per-flight basis, as compared to aircraft

¹⁰2012 Act, § 213, 126 Stat., 46.

¹¹[GAO-13-264](#).

operations that follow existing procedures.¹² However, our April 2013 report found that, according to FAA, potential noise impacts are measured cumulatively for all flights and that FAA has not yet identified an approach for per-flight assessments. FAA officials stated that no currently available methodology resolves the technical problems involved in making such a determination, so the agency has not applied this new categorical exclusion.¹³ Second, the 2012 Act called for the agency to establish a program for qualified third parties to develop, test, and maintain flight procedures.¹⁴ FAA has made some progress in this area by awarding a \$2.8-million contract to GE's Naverus and a partner to develop two PBN procedures each at five mid-sized airports. The contractors are to design, evaluate, and maintain these procedures and be responsible for providing environmental data and analysis to FAA to support categorical exclusions and for drafting any required National Environmental Policy Act reviews, for review and approval by FAA. As of January 2014, PBN procedures had been implemented at two of the five selected airports.

Balancing the Needs of the Current and NextGen Systems

NextGen represents a transition from existing ATC systems and facilities to new systems, potentially necessitating changes to or consolidation of existing facilities. We have reported over the years that various investment and policy decisions, including what existing ATC systems and facilities will remain in the NAS during the transition and for how long, have yet to be made.¹⁵ For the systems and facilities that remain, FAA will have to monitor and maintain their performance and condition while the agency implements the NextGen transition. Decisions about the number of existing systems and facilities that will remain in operation during the

¹²A federal action may be categorically excluded—thus exempting it from further federal environmental review—if, based on agency experience, the agency has determined the proposed action is within a category of actions that do not individually or cumulatively have a significant effect on the environment and there are no extraordinary circumstances in which a normally excluded action may have a significant environmental effect. See 40 C.F.R. § 1508.4.

¹³See Section 213(c)(1) and (2), and Section 213(f).

¹⁴[GAO-13-264](#).

¹⁵GAO, *Integration of Current Implementation Efforts with Long-term Planning for the Next Generation Air Transportation System*, [GAO-11-132R](#) (Washington, D.C.: Nov. 22, 2010) and *Next Generation Air Transportation System: FAA Faces Implementation Challenges*, [GAO-12-1011T](#) (Washington, D.C.: Sept. 12, 2012).

transition have implications for FAA's capital and operations budgets going forward. If aging systems and associated facilities are not retired, FAA will miss potential opportunities to reduce its overall maintenance costs at a time when resources needed to maintain both systems and facilities may become scarcer.

The 2012 Act contained a number of provisions aimed at accelerating the implementation of NextGen systems.¹⁶ However, we found in August 2013 that FAA's budget planning does not fully account for the potential impact of NextGen systems that will be deployed and the need for continued operations and maintenance of existing systems and facilities.¹⁷ In the 2012 Act, Congress also expressed concern regarding the condition of FAA facilities and mandated that we study their condition. In our September 2013 report, we noted that FAA estimates its staffed facilities like towers and Terminal Radar Approach Control (TRACON) facilities have about \$260 million in deferred maintenance; unstaffed facilities, such as shelters and communication towers that house and support NAS equipment, had an estimated \$446 million in deferred maintenance in 2012. These, and other cost estimates for maintaining existing systems and facilities, along with implementing NextGen exceed anticipated funding levels. However, we concluded that FAA's imprecise facility-condition data do not facilitate agency-wide priority assessments, which, in turn, could hinder the agency's ability to target its limited resources on those projects in greatest need of repair and that are most critical to the NAS. In addition, section 804 of the 2012 Act directed FAA to complete a study on the consolidation and realignment of FAA services and facilities to support the transition to NextGen. However, FAA has yet to identify which facilities would be consolidated or realigned, and according to FAA officials, the study will continue through 2014.

In our August 2013 report we recommended improvements to FAA's budget-planning and infrastructure-condition data, improvements that FAA is currently considering. Improved budget planning and accurate and reliable data on infrastructure condition could help Congress better understand the funding requirements of existing systems and facilities and facilitate FAA's efforts to support the agency's mission of continuing to safely operate the NAS along with the longer-term goal of transitioning

¹⁶See, for example, Section 211, 213, and 216.

¹⁷[GAO-13-693](#).

to NextGen. We will continue to monitor FAA's progress in implementing these recommendations.

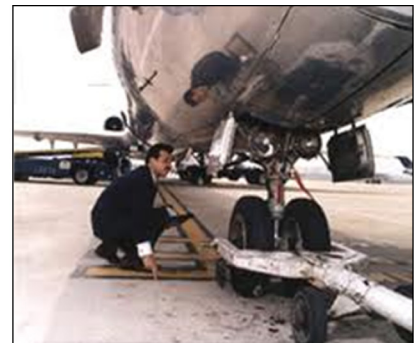
FAA Is Continuously Working to Improve Safety and Has Made Progress in Improving Its Certification Processes

The U.S. air transportation system remains one of the safest in the world. As part of FAA's efforts to maintain and improve the safety of the system, FAA issues certificates and approvals for new air operators, new aircraft, and aircraft parts and equipment, and grants approvals for changes to air operations and aircraft based on FAA's interpretation of federal standards (see fig. 2). These certificates and approvals indicate that such things as new aircraft, the design and production of aircraft parts and equipment, and new air operators are safe for use in the NAS. However, our previous work has highlighted FAA's inconsistent regulatory interpretation of certification standards. In 2010, we found that variation in FAA's interpretation of standards for certification and approval decisions was a long-standing issue and made recommendations to improve those processes.¹⁸ Subsequently, the 2012 Act required FAA to work with industry to assess the certification process, including reviewing our previous work and developing recommendations to address the concerns that we and others have raised.¹⁹

Figure 2: FAA Conducts Inspections as Part of Certification



Source: FAA.



Source: FAA.

¹⁸GAO, *Aviation Safety: Certification and Approval Processes Are Generally Viewed as Working Well, but Better Evaluative Information Needed to Improve Efficiency*, [GAO-11-14](#) (Washington, D.C.: Oct. 7, 2010).

¹⁹Pub. L. No. 112-95, § 312 and § 313, 126 Stat. 11, 66 and 67(2012). [GAO-11-14](#).

As required by Section 312 of the 2012 Act, FAA, in consultation with representatives of the aviation industry, made recommendations to the director of FAA's Aircraft Certification Service regarding streamlining and reengineering the certification process. These recommendations, which we found to be relevant, clear, and actionable, called for FAA to:

1. improve the effectiveness of its delegation programs,
2. update certification procedures to reflect a systems approach to safety,
3. review operational safety and rulemaking processes, and
4. implement efficiency reforms, among others.²⁰

In July 2013, FAA released its plan to implement these recommendations. The plan included 14 initiatives and programs that FAA either had under way or intended to start to improve efficiency and reduce costs related to certifications. We found these initiatives were generally relevant to the recommendations and were clear and measurable. However, we found that FAA's plans do not contain some of the elements essential to a performance measurement process.²¹ For example, FAA has developed milestones for each initiative and deployed a tracking system to monitor the implementation of all certification-related initiatives, but it has not yet developed performance measures to track the success of most of the initiatives and programs. According to an FAA official, the agency has started discussions with industry stakeholders to identify key goals related to performance measurement. Because industries' goals and FAA's goals may be different with respect to the certification process, developing meaningful performance measures is a complex task that the agency plans to continue in 2014. The Committee recently asked us to examine in more detail FAA's progress and any challenges experienced in implementing the recommendations and making improvements to its certification processes, and will be tracking FAA's efforts going forward.

Also resulting from issues found in our 2010 report on certification, section 313 of the Act directed FAA to establish an advisory panel to

²⁰See GAO, *Aviation Safety, Status of Recommendations to Improve FAA's Certification and Approval Processes*, [GAO-14-142T](#), (Washington, D.C.: Oct. 30, 2013).

²¹[GAO-14-142T](#).

address inconsistencies in the interpretation of regulations by the certification offices. Consistent with issues raised in our 2010 report, this committee identified three root causes of inconsistent interpretation of regulations: (1) unclear regulatory requirements; (2) inadequate and nonstandard FAA and industry training in developing regulations, applying standards, and resolving disputes; and (3) a culture that includes a general reluctance by both industry and FAA to work issues of inconsistent regulatory application through to a final resolution and a “fear of retribution.” To address these root causes, the committee made six recommendations, including developing a master source of guidance and developing instructions for FAA staff with policy development responsibility. We found that the advisory committee took a reasonable approach in identifying the root causes and that its recommendations were relevant, actionable, and clear.²² The committee also considered the feasibility of the recommendations by identifying modifications to existing efforts and programs and prioritizing the recommendations.

FAA reported in January 2014 that it was still determining the feasibility of implementing these recommendations. The agency told us that it expected to publish an action plan to address the recommendations and metrics to measure implementation by late June 2014, more than six months after FAA’s initial target. We note that while measuring implementation may be useful, FAA is not intending to measure outcomes, a measurement that could help in understanding if an action is having the intended effect.

While Progress Has Been Made, Safely Integrating UAS into the NAS Will Continue to Present Challenges for FAA

UAS are aircraft and associated equipment that do not carry a pilot aboard, but instead operate on pre-programmed routes or are manually controlled by pilot-operated ground stations. Although current non-military, domestic uses of UAS are limited to activities such as law enforcement, forensic photography, border security, and scientific data collection, UAS have a wide range of other potential commercial uses—including vehicular traffic monitoring, crop dusting, and pipeline inspections—and the market for UAS use is expected to grow. Concerned with the pace of integrating UAS into the NAS, Congress established specific requirements and set deadlines for FAA in the 2012 Act.

²²[GAO-14-142T](#).

FAA has several efforts under way to satisfy the 2012 Act's requirements, most of which must be achieved by December 2015. In January 2013 we reported that of the seven deadlines that had passed, FAA had completed two items. However, since that time, FAA has satisfied a number of additional milestones (see app. III for an update of all the 2012 Act's requirements with respect to UAS). Of particular note:

- JPDO and FAA released a UAS Comprehensive Plan and a UAS Roadmap, respectively, in November 2013 to outline the nation's UAS goals and objectives and the tasks necessary to achieve UAS integration.^{23 24}
- In late December 2013, FAA selected the six locations for its UAS test site program.
- FAA established permanent Arctic areas where small UAS can operate for research and commercial purposes and the first flight took place in the fall of 2013.

While progress has been made implementing some of the key milestones established in the 2012 Act, integrating UAS into the NAS continues to challenge FAA leading to uncertainty about when UAS integration will be achieved.²⁵ For example, while FAA announced the six locations for its UAS test site program, FAA has not yet defined what operational, safety, and performance data it needs from the test sites and how that data will be collected and analyzed. We previously reported that use of these data would be important in developing safety, reliability, and performance standards, which are needed to guide and validate the supporting research and development efforts. FAA and industry stakeholders have stated that data and other information generated by the test sites will be important in helping FAA answer key research questions related to UAS operations and developing regulations and operational procedures for future commercial and civil use of UAS. Finally, to increase collaboration and provide stable organizational leadership, and focus on UAS integration efforts, FAA created the UAS Integration Office in 2013. While the office did not have an operations budget, as of January 2014, the

²³JPDO, *Unmanned Aircraft Systems Comprehensive Plan: A Report on the Nation's UAS Path Forward* (Washington, D.C.: September, 2013).

²⁴FAA, *Integration of Civil Unmanned Aircraft Systems in the National Airspace System Roadmap: First Edition—2013* (Washington, D.C.: November, 2013).

²⁵FAA, *Integration of Civil Unmanned Aircraft Systems in the National Airspace System Roadmap: First Edition—2013* (Washington, D.C.: Nov. 2013).

office has 33 full time employees, and FAA is still finalizing agreements and other arrangements related to the reorganization, and it remains unclear what resources the office will have available to fulfill its role.

Moving forward, FAA has a number of important milestones it must meet to ensure UAS integration into the NAS. A key next step, according to FAA officials and industry stakeholders, will be to adopt a final rule for small UAS operations.²⁶ Although FAA has had efforts under way since 2008 supporting a rulemaking on small UAS, it is unlikely that FAA will meet the August 2014 final rule deadline required by the 2012 Act. For example, FAA has not yet issued a Notice of Proposed Rulemaking for small UAS, and recently estimated that one will not be released until November 2014. Further, FAA must develop standards—and determine what data are necessary to inform that process—to facilitate safe UAS integration into the NAS. More broadly, to achieve UAS integration, FAA faces the challenge of ensure that all of the various efforts supporting these integration issues within its own agency, as well as across federal agencies and other entities, align and converge in a timely fashion. We have begun additional work on UAS that will be looking specifically at collaboration between federal agencies responsible for UAS integration into the NAS and the research and development priorities in the area of research and development to support UAS integration.

In closing, FAA has made some progress in implementing various parts of the 2012 Act, and is seeking to address some of the key challenges it faces. Going forward, we will continue to monitor FAA's progress, highlight the key challenges that remain, and the steps FAA and industry can take to find a way forward on the issues covered in this statement as well as other issues facing the industry. For example as previously mentioned, we have work underway to examine organizational and leadership issues with NextGen, and to examine, in greater detail, FAA's certification processes and progress made with respect to UAS. In addition, for this Committee we will be examining issues related to funding airport development, including passenger facility charges, airport improvement program grants, and the potential for greater private sector investment through public-private partnerships.

²⁶Generally, a *small* UAS is less than 55 pounds, while a *large* UAS is 55 pounds or more. According to an industry association, small UAS are expected to comprise the majority of UAS that will operate in the national airspace.

Chairman LoBiondo, Ranking Member Larsen, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

Appendix I: Related GAO Reports and Testimonies

NextGen

NextGen Air Transportation System: FAA Has Made Some Progress in Midterm Implementation, but Ongoing Challenges Limit Expected Benefits. [GAO-13-264](#). Washington, D.C.: April 8, 2013.

Next Generation Air Transportation System: FAA Faces Implementation Challenges. [GAO-12-1011T](#). Washington, D.C.: September 12, 2012.

Air Traffic Control Modernization: Management Challenges Associated with Program Costs and Schedules Could Hinder NextGen Implementation. [GAO-12-223](#). Washington, D.C.: February 16, 2012.

Next Generation Air Transportation System: FAA Has Made Some Progress in Implementation, but Delays Threaten to Impact Costs and Benefits. [GAO-12-141T](#). Washington, D.C.: October 5, 2011.

Integration of Current Implementation Efforts with Long-term Planning for the Next Generation Air Transportation System. [GAO-11-132R](#). Washington, D.C.: Nov. 22, 2010.

NextGen Air Transportation System: FAA's Metrics Can Be Used to Report on Status of Individual Programs, but Not of Overall NextGen Implementation or Outcomes. [GAO-10-629](#). Washington, D.C.: July 27, 2010.

Aviation Safety and Certification

Aviation Safety, Status of Recommendations to Improve FAA's Certification and Approval Processes. [GAO-14-142T](#). Washington, D.C.: Oct. 30, 2013.

Aviation Safety: FAA Efforts Have Improved Safety, but Challenges Remain in Key Areas. [GAO-13-442T](#). Washington, D.C.: April 16, 2013.

Aviation Safety: Additional FAA Efforts Could Enhance Safety Risk Management. [GAO-12-898](#). Washington, D.C.: September 12, 2012.

Aviation Safety: Certification and Approval Processes Are Generally Viewed as Working Well, but Better Evaluative Information Needed to Improve Efficiency. [GAO-11-14](#). Washington, D.C.: October 7, 2010.

Unmanned Aircraft Systems (UAS)

Unmanned Aircraft Systems: Continued Coordination, Operational Data, and Performance Standards Needed to Guide Research and Development. [GAO-13-346T](#). Washington, D.C.: February 15, 2013.

Unmanned Aircraft Systems: Measuring Progress and Addressing Potential Privacy Concerns Would Facilitate Integration into the National Airspace System. [GAO-12-981](#). Washington, D.C.: Sept. 14, 2012.

Appendix II: Key Findings from Seven GAO Reports That Were Mandated by the FAA Modernization and Reform Act

- *Passenger facility charges.* We evaluated three alternative methods to the current ticket-based method of collecting passenger facility charges and found that each faces considerable technological challenges, for example, to implement.¹ While none of the three methods that we evaluated are currently better than the existing collection method, it is possible that in the future some of these challenges will be reduced as technology advances or that airports might be willing to accept the additional costs and impose additional passenger burdens in return for an increase in their capital funding.
- *Dense, continuous smoke in the cockpit.* FAA uses a variety of approaches, including certifying airplane design and inspecting air carriers, to oversee procedures and technologies that prevent or mitigate the effects of dense, continuous smoke in the cockpit.² We identified five procedures and technologies that FAA oversees: (1) certification standards for aircraft design that include smoke's evacuation; (2) a requirement that air carriers provide protective breathing equipment that protects the flightcrew from the effects of smoke; (3) a requirement that air carriers' pilot-training programs cover principles of emergency operations and emergency communications procedures; (4) a requirement that an FAA-approved emergency procedures checklist be provided by air carriers and used by their flight crewmembers; and (5) oversight of the Emergency Vision Assurance System, a device that provides a means to see during a dense, continuous smoke event, that FAA has approved for installation on several models of commercial airplanes.
- *Compensation for delayed baggage.* According to DOT data, the number of mishandled baggage³ reports has decreased since 2008 when airlines first began charging for the first checked bag.⁴ There are a number of factors that could contribute to this decline, such as a decline in the number of bags checked and improved baggage–

¹GAO, *Alternative Methods for Collecting Airport Passenger Facility Charges*, [GAO-13-262R](#) (Washington, D.C.: Feb. 14, 2013).

²GAO, *Transportation: FAA Oversight of Procedures and Technologies to Prevent and Mitigate the Effects of Dense, Continuous Smoke in the Cockpit*, [GAO-13-551R](#) (Washington, D.C.: June 4, 2013)

³A "mishandled baggage" report is a report filed with a carrier by or on behalf of a passenger who claims loss, delay, damage, or pilferage of baggage. A mishandled-baggage report may represent one or more mishandled bags.

⁴GAO, *Delayed-Baggage Trends and Options for Compensating Passengers*, [GAO-12-804R](#) (Washington, D.C.: June 14, 2012).

handling processes; however, data limitations impeded further analysis.⁵ We described DOT's options for and the impact of implementing minimum compensation standards for delayed baggage, which included (1) keeping current regulations, which, among other things, require compensation for reasonable expenses that result because of delay in the delivery of baggage; (2) reimbursing passengers for the checked baggage fee if the bag is delayed; and (3) implementing compensation standards based on the length of delay.

- *Air Traffic Collegiate Training Initiative (CTI)*. We found that the cost-effectiveness of the CTI schools depends on a number of cost elements that are currently unknown, including the upfront cost of developing new curriculums and how FAA implements training through the CTI schools, among other factors.⁶ In addition, we were not able to determine the potential effect of the alternative air-traffic-controller-training approach through CTI schools on controller trainees; the concept would need further development before comparisons can be made about performance outcomes for such trainees under the current approach through the FAA Academy and the alternative approach through the CTI schools.
- *FAA facility condition*. While FAA has mechanisms to identify and mitigate safety deficiencies at FAA facilities and has taken actions to strengthen its capital planning process to help ensure its facilities are in good condition, our analysis of FAA's statistical model for estimating the condition of uninspected terminal facilities found the model to be imprecise; it uses one variable—age of the facility—to estimate the facility's condition.⁷ Furthermore, inaccuracies in FAA's real-estate management database undermine its usefulness as a management tool to manage its real estate portfolio. We recommended that FAA take action to improve the precision of the methods it uses to estimate the conditions of uninspected terminal facilities and implement a plan to improve its database for tracking its inventory of real property assets, consistent with sound data-collection practices.

⁵DOT's data do not distinguish between delayed baggage and other types of mishandled baggage, such as those that are lost, damaged, or pilfered.

⁶GAO, *Review of FAA's Collegiate Training Initiative as Mandated in the FAA Modernization and Reform Act of 2012*, [GAO-12-996R](#) (Washington, D.C.: Aug. 24, 2012).

⁷GAO, *FAA Facilities: Improved Condition Assessment Methods Could Better Inform Maintenance Decisions and Capital-Planning Efforts*, [GAO-13-757](#) (Washington, D.C.: Sept. 10, 2013).

- *National Mediation Board.* We found that the National Mediation Board, which facilitates labor relations and oversees union elections in two key transportation sectors—railroads and airlines—through mediation and arbitration of labor disputes and overseeing union elections, has adapted to challenges presented by large union elections resulting from airline mergers and has implemented improvements such as online voting.⁸ However, the board lacks some controls in key management areas that could risk its resources and its success such as having a formal mechanism for tracking resolution of findings and recommendations. We made a number of recommendations to improve the board's planning and make the most effective use of its limited resources and also noted that Congress should consider authorizing an appropriate federal agency's Office of Inspector General to provide additional oversight.
- *Airport-intercity passenger rail connectivity.* Most major U.S. airports have some degree of physical proximity to intercity passenger rail stations; however, air-rail connectivity remains limited due to a variety of factors.⁹ We found that connectivity between these two modes may provide a range of mobility, economic, and environmental benefits, and while strategies exist to improve connectivity, the costs and trade-offs of enhancing connectivity could be substantial.

⁸GAO, *National Mediation Board: Strengthening Planning and Controls Could Better Facilitate Rail and Air Labor Relations*, [GAO-14-5](#) (Washington, D.C.: Dec. 3, 2013).

⁹ GAO, *Intermodal Transportation: A Variety of Factors Influence Airport-Intercity Passenger Rail Connectivity*, [GAO-13-691](#) (Washington, D.C.: Aug. 2, 2013).

Appendix III: Status of Requirements for UAS Integration under the 2012 Act as of January 2014

Deadline	FAA Modernization and Reform Act of 2012 requirement	Status of action
05/14/2012	Enter into agreements with appropriate government agencies to simplify the process for issuing Certificates of waiver or authorizations (COAs) or waivers for public UAS.	In process—memorandum of agreement (MOA) with the Department of Defense (DOD) signed September of 2013; MOA with Department of Justice (DOJ) signed March 2013; MOA with National Aeronautics and Space Administration (NASA) in final coordination; MOA with Department of Interior (DOI) and National Oceanic and Atmospheric Administration (NOAA) are still in draft.
08/12/2012	Establish a program to integrate UAS into the national airspace at six test ranges. This program is to terminate 5 years after date of enactment.	In process
08/12/2012	Develop an Arctic UAS operation plan and initiate a process to work with relevant federal agencies and national and international communities to designate permanent areas in the Arctic where small unmanned aircraft may operate 24 hours per day for research and commercial purposes.	Completed
08/12/2012	Determine whether certain UAS can fly safely in the national airspace before the completion of the Act's requirements for a comprehensive plan and rulemaking to safely accelerate the integration of civil UAS into the national airspace or the Act's requirement for issuance of guidance regarding the operation of public UAS including operating a UAS with a COA or waiver.	Completed
11/10/2012	Expedite the issuance of a COA for public safety entities	Completed
11/10/2012	Develop a comprehensive plan to safely accelerate integration of civil UAS into national airspace.	Completed
11/10/2012	Issue guidance regarding operation of civil UAS to expedite COA process; provide a collaborative process with public agencies to allow an incremental expansion of access into the national airspace as technology matures and the necessary safety analysis and data become available and until standards are completed and technology issues are resolved; facilitate capability of public entities to develop and use test ranges; provide guidance on public entities' responsibility for operation.	Completed
02/12/2013	Make operational at least one project at a test range.	In-process
02/14/2013	Approve and make publically available a 5-year roadmap for the introduction of civil UAS into national airspace, to be updated annually.	Completed
02/14/2013	Submit to Congress a copy of the comprehensive plan.	Completed
08/14/2014	Publish in the Federal Register the Final Rule on small UAS.	In process
08/14/2014	Publish in the Federal Register a Notice of Proposed Rulemaking to implement recommendations of the comprehensive plan.	None to date
08/14/2014	Publish in the Federal Register an update to the Administration's policy statement on UAS in Docket No. FAA-2006-25714.	None to date
09/30/2015	Achieve safe integration of civil UAS into the national airspace.	In process

**Appendix III: Status of Requirements for UAS
Integration under the 2012 Act as of January
2014**

Deadline	FAA Modernization and Reform Act of 2012 requirement	Status of action
12/14/2015	Publish in the Federal Register a Final Rule to implement the recommendations of the comprehensive plan.	None to date
12/31/2015	Develop and implement operational and certification requirements for public UAS in national airspace.	In process
02/14/2017	Report to Congress on the test ranges.	None to date

Source: GAO analysis of FAA Modernization and Reform Act and FAA's progress.

Appendix IV: GAO Contact and Staff Acknowledgments

For further information on this testimony, please contact Gerald L. Dillingham, Ph.D., at (202) 512-2834 or dillinghamg@gao.gov. In addition, contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals making key contributions to this testimony include Andrew Von Ah, Assistant Director; Mike Armes, Martha Chow; Geoff Hamilton; Dave Hooper; Daniel Hoy; Eric Hudson; Bert Japikse; Heather Krause, Sara Ann Moessbauer; Faye Morrison; Nalylee Padilla; Melissa Swearingen; and Jessica Wintfeld.

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