



U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF INSPECTOR GENERAL

**FAA Has Made Progress Implementing
NextGen Priorities, but Additional Actions
Are Needed To Improve Risk
Management**

FAA

Report No. AV2018001

October 18, 2017





FAA Has Made Progress Implementing NextGen Priorities, but Additional Actions Are Needed To Improve Risk Management

Requested by the Chairmen and Ranking Members of the House Committee on Transportation and Infrastructure and its Aviation Subcommittee

Federal Aviation Administration | AV2018001 | October 18, 2017

What We Looked At

The Federal Aviation Administration's (FAA) Next Generation Air Transportation System (NextGen) aims to modernize the Nation's air traffic system and provide safer and more efficient air traffic management by 2025. In 2013, the NextGen Advisory Committee (NAC) recommended the aviation industry's four priorities for NextGen investment—Multiple Runway Operations, Performance-based Navigation, Surface Operations, and Data Communications (DataComm). At the request of Congress, in November 2014, we identified the steps the Agency was taking to address NAC's priorities and made three recommendations; to date, FAA has completed actions on two of them. In this follow-up audit, we assessed FAA's (1) process for identifying risks to implementing the four prioritized NextGen capabilities and (2) actions to mitigate any identified risks. We also assessed the Agency's progress in implementing the four capabilities in the context of the identified risks.

What We Found

FAA is making significant progress in implementing the four NAC priorities. However, the Agency lacks a comprehensive process for effectively identifying or assessing risks, which could hinder its ability to fully implement its priorities. For example, while FAA took some steps to identify risks, it did not fully engage or include all stakeholders or effectively evaluate the severity of the identified risks to ensure its implementation milestones were realistic. In addition, FAA is not proactively mitigating risks to keep the NAC priorities on track. In particular, FAA and industry will need to mitigate several complex risks for capabilities expected for implementation and benefits delivery in the 2019–2020 timeframe, such as resolving issues with DataComm technology installed in aircraft. However, the Agency has not developed a detailed mitigation plan to address identified risks, involved industry in its decision-making process, or transparently reported its progress in this area.

Our Recommendations

We will not make any new recommendations until FAA has completed actions on the remaining open recommendation from our November 2014 report.

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Memorandum

Date: October 18, 2017

Subject: ACTION: FAA Has Made Progress Implementing NextGen Priorities, but Additional Actions Are Needed To Improve Risk Management
Report No. AV2018001

From: Matthew E. Hampton
Assistant Inspector General for Aviation Audits

To: Federal Aviation Administrator

The Federal Aviation Administration's (FAA) multibillion-dollar Next Generation Air Transportation System (NextGen) aims to modernize the Nation's air traffic system and provide safer and more efficient air traffic management by 2025. Given the large scope of FAA's NextGen effort, establishing priorities is key to maximizing near-term benefits and securing stakeholder involvement.

In July 2013, FAA tasked the NextGen Advisory Committee (NAC)¹ with reviewing the Agency's plans for NextGen implementation and recommending priorities for investment. Beginning in a September 2013 report, the NAC identified the aviation industry's four top priorities as Multiple Runway Operations (MRO), Performance-based Navigation (PBN), Surface Operations, and Data Communications (DataComm). The committee chose these capabilities based on the benefits to users of the National Airspace System (NAS), technological maturity, and implementation readiness.² During our review, FAA and the NAC began discussions on adding a fifth priority—to focus on reducing congestion in the Northeast corridor.

Recognizing the NAC's potential to reshape NextGen's future, the Chairmen and Ranking Members of the House Committee on Transportation and Infrastructure and its Aviation Subcommittee requested that we examine FAA's response to the

¹ The NAC is a Federal advisory committee established to develop recommendations for NextGen portfolios with an emphasis on the midterm (through 2020) and includes operators, manufacturers, air traffic management, aviation safety, airports, and environmental experts.

² NAC, *NextGen Prioritization: A Report of the NextGen Advisory Committee in Response to Tasking from the Federal Aviation Administration*, September 2013.

NAC's recommendations, including the Agency's actions to adjust its budgets and plans. In November 2014, we issued an interim report³ that identified the steps the Agency was taking to address the NAC's recommended investment priorities and specifically aimed the three recommendations at assigning roles and responsibilities, monitoring progress, and reducing risk. To date, FAA had completed actions needed on two of them.⁴

Our objectives in this follow-up audit were to assess FAA's (1) process for identifying risks to implementing the four prioritized NextGen capabilities and (2) actions to mitigate any identified risks. In addition, we assessed the Agency's progress in implementing the four capabilities in the context of the identified risks.

We conducted our work in accordance with generally accepted Government auditing standards. See exhibit A for a description of our scope and methodology, and exhibit B for a list of the organizations we visited or contacted.

We appreciate the courtesies and cooperation of Department of Transportation representatives during this audit. If you have any questions concerning this report, please call Matthew E. Hampton, Assistant Inspector General for Aviation Audits, at (202) 366-0500.

cc: The Secretary
DOT Audit Liaison, M-1
FAA Audit Liaison, AAE-100

³ *Planning For High-Priority NextGen Capabilities Underway, But Much Work Remains for Full Realization of Benefits* (OIG Report No. AV2015012), November 2014. OIG reports are available on our website at <https://www.oig.dot.gov/>.

⁴ We closed recommendations for FAA to establish clear lines of responsibility with stakeholders and to develop a tool or system to monitor progress against milestones. FAA is still working to address the remaining open recommendation, which directed the Agency to develop a risk-mitigation strategy for missed milestones or if commitments change.

Background

In the months following the NAC's September 2013 report, FAA increased its collaborative effort with the aviation industry through the NextGen Integration Working Group (NIWG),⁵ and worked with industry to develop implementation plans for capabilities (see exhibit C) in each of the four priorities (see figure 1).

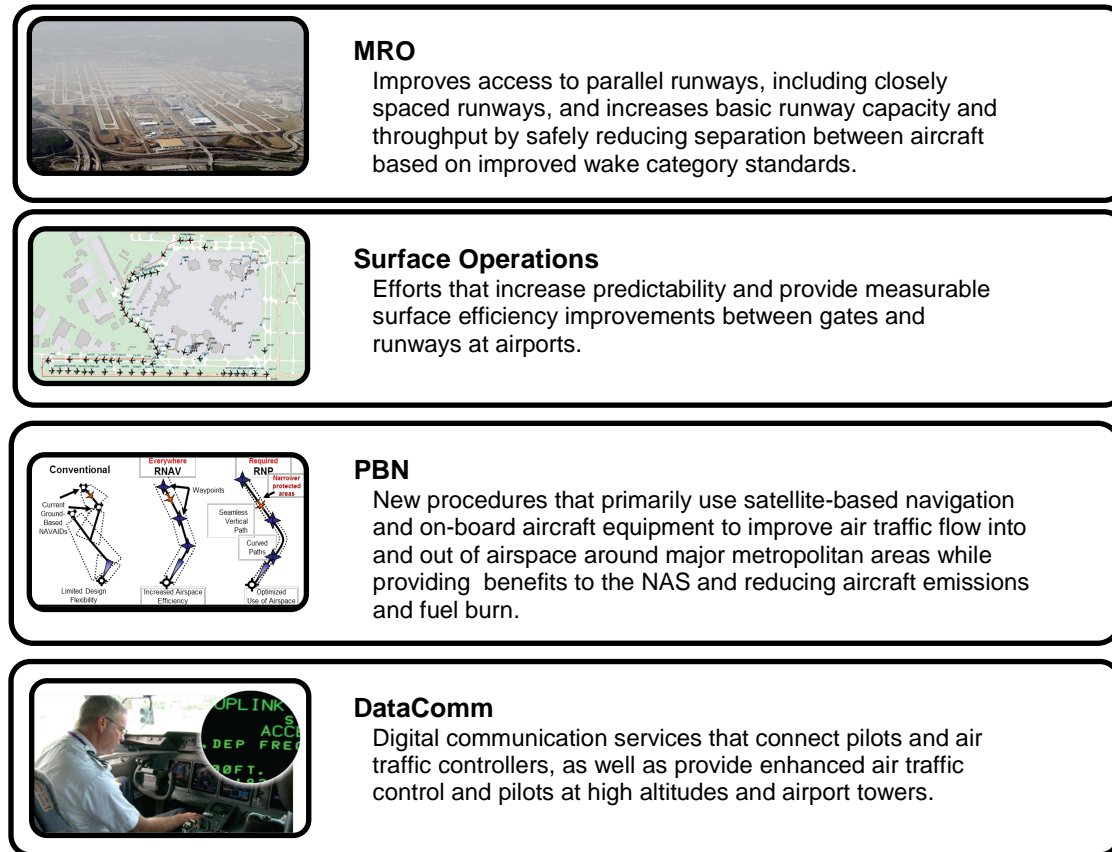
FAA published the NextGen Priorities Joint Implementation Plan in October 2014, which identified specific locations, timelines, and cost estimates through fiscal year 2017. In addition, FAA and industry worked together to develop three categories of commitments (see below) and a timeline of milestones and locations for each capability. These commitments included:

- **Implementation Commitments:** milestones for operational implementation at specific locations that would be available for immediate use;
- **Pre-implementation Commitments:** major activities such as safety analyses, engineering studies, and investment analyses for capabilities FAA and the aviation community are interested in pursuing; and
- **Industry Commitments:** activities required for successful implementation that industry is committed to complete.

In December 2014, FAA and industry developed the NextGen Priorities Joint Implementation Plan Oversight Process, which outlined how FAA and the NAC would measure progress in the implementation of the top four priorities as well as monitor risks. FAA tasked the NIWG to discuss progress, implementation, challenges, and risks. In addition, FAA committed to provide progress reports on the Agency's public website and through the NAC's public meetings.

⁵ The NIWG is comprised of FAA subject matter experts, industry experts, and airspace users.

Figure 1. NextGen Joint Implementation Plan Top Priorities



Source: FAA

Results in Brief

FAA is making significant progress in implementing the four NAC priorities but lacks a comprehensive process for effectively identifying or assessing risks, which could hinder its ability to fully implement its priorities.

While FAA conducted a risk review⁶ to identify implementation risks after the NAC's 2014 report, its review was limited in scope and was not completed until after the Agency began implementing the NAC's priorities. Therefore, the results of the review were not available to significantly influence implementation milestones. In addition, while FAA took other steps to identify risks, including a review of program-level safety assessments, the process the Agency established

⁶ NextGen Priority Joint Implementation Plan Risks and Mitigations Report, February 2015.

to monitor progress did not fully engage or include all stakeholders, a key element in Government internal control guidance. FAA also did not effectively evaluate the severity of the identified risks to ensure its implementation milestones were realistic and achievable. This is in part because FAA relied on individually managed programs to identify and assess risks, instead of a comprehensive, systemic approach by the NextGen Office. FAA's lack of an effective risk identification and management process has led to delays and increases the risk that the Agency may not be able to deliver capabilities and benefits⁷ to the NAS as planned. For example, FAA planned to implement the Airport Surface Surveillance Capability (ASSC), a key system to allow controllers to detect vehicles in the airport movement area and enhance runway capacity, even though Agency officials had been aware of unresolved safety concerns as early as 2010. FAA did not effectively factor this risk into its planning, and as a result, this high-priority capability has now experienced a delay of more than 2 years.

FAA is not proactively mitigating risks to keep the NAC priorities on track.

After identifying risks, an effective risk management process requires developing clear plans to mitigate risks, according to Office of Management and Budget (OMB) guidance. However, the Agency has not developed a detailed mitigation plan with specific steps to address identified risks for the initiatives. FAA also did not include industry in its mitigation-decision process for implementing the capabilities. To date, FAA has not documented its risk-mitigation activities, and has limited its risk mitigation strategy to adjusting and removing milestones, rather than seeking alternatives to adjusting milestones as recommended in Government standards. For example, FAA removed the milestones for eight sites where a capability was planned to provide improved surveillance through ASSC after delays occurred at Cleveland Hopkins International Airport. The lack of a detailed mitigation plan to ensure FAA achieves milestones and obtains near-term benefits could jeopardize future NextGen plans. This is particularly the case for surface operations, as FAA and industry will face complex challenges in implementing these capabilities and obtaining benefits in the 2019–2020 timeframe. In addition, FAA has not fully or transparently reported its progress in implementing these capabilities. As a result, FAA's efforts to mitigate risks to implementing these key NextGen capabilities and achieving benefits will be limited.

We are not making any new recommendations until FAA has completed actions on the remaining open recommendation from our November 2014 report.

⁷ A capability is a procedure or technological development designed to improve performance or capacity in the NAS.

FAA Has Acted on NextGen Priorities but Lacks a Comprehensive Process for Identifying and Assessing Risks

FAA has made progress toward implementing capabilities among the four NAC priorities. However, FAA has not established an effective process for identifying and assessing risks to further advance the four NextGen capabilities. While FAA took steps to identify risks, including a review of program-level assessments, it did not engage or include all stakeholders in the risk-identification process. In addition, FAA did not effectively assess the severity of identified risks or how they would impact milestones and benefits, limiting the Agency’s ability to effectively manage them.

FAA Has Made Progress in Implementing NextGen Priority Capabilities

Between October 1, 2014, and March 31, 2017, FAA reported completing approximately 93 percent of its planned commitments within the four prioritized investment areas (see table 1).

Table 1. Progress of the NextGen Priorities Joint Implementation Plan, as of March 31, 2017

Priority	FY 2015		FY 2016		FY 2017	
	Number of Planned Milestones ⁸	Number of Milestones Implemented	Number of Planned Milestones	Number of Milestones Implemented	Number of Planned Milestones	Number of Milestones Implemented
MRO	12	10	15	17	9	8
PBN	4	4	3	7	20	18
Surface Operations	11	10	8	9	9	1
DataComm	5	5	51	48	11	10
Total	32	29	77	81	49	37

Source: OIG analysis of FAA’s Joint Implementation Plan and NextGen Performance Snapshots.

⁸ The planned milestones represent the milestones as published in the Joint Implementation Plans (2014, 2015, and 2017-2019).

Highlights of FAA's progress in each prioritized area include:

- **MRO:** FAA implemented Wake Recategorization (RECAT),⁹ a capability that reduces separation between aircraft on arrivals and departures, at 12 airports nationwide, including Hartsfield-Jackson Atlanta International Airport, George Bush Houston Intercontinental Airport, and John F. Kennedy International Airport.
- **PBN:** FAA declared that the Northern California Metroplex had reached initial operational capability during the second calendar quarter of 2015, approximately 3 months ahead of schedule. Between September 2014 and April 2015, FAA conducted a phased implementation of 44 routes covering the greater San Francisco Bay Area and Sacramento.
- **Surface Operations:** FAA implemented System Wide Information Management (SWIM) Surface Visualization Tool (SVT) ahead of schedule at five Terminal Radar Approach Control facilities (TRACON).¹⁰ This system allows TRACON controllers to better monitor congestion and plan for changes on airport runways and taxiways, especially during inclement weather.
- **DataComm:** FAA is also making strides with DataComm, implementing the capability at 3 key towers in 2015 and at a total of 55 towers through December 2016. To its credit, the Agency is implementing the capability at towers across the Nation approximately 30 months ahead of schedule.

Despite FAA's progress in meeting milestones to date, considerable work remains ahead for implementing new PBN procedures to capture airspace efficiencies, surface technologies to enhance capacity on crowded runways and taxiways, and DataComm in the high-altitude environment to improve pilot and controller communication and achieve anticipated benefits from re-routing aircraft in bad weather. A comprehensive risk management plan will be essential for FAA and industry stakeholders to manage complex challenges with implementing these capabilities.

⁹ Wake Recategorization replaces the previous weight-based classes with approved wake turbulence categories that more optimally group aircraft based on their wake turbulence characteristics and the current fleet mix for U.S. (and European) airports.

¹⁰ A TRACON is a facility where air traffic controllers guide aircraft as they approach or leave airspace within 40 miles of an airport.

FAA Did Not Include Key Risk-Management Elements and Industry Stakeholders in Its Process for Identifying Risks

Although FAA established a risk-mitigation process for the NAC priorities, several weaknesses limit its effectiveness. According to the internal control standards developed by the Government Accountability Office (GAO),¹¹ Agency management should identify and analyze risks to achieving defined objectives, as well as consider all significant interactions with external parties, changes within the entity’s internal and external environment, and other internal and external factors. Additionally, OMB guidance¹² issued in 2016 states that effective risk management is timely, structured, transparent, and inclusive. OMB guidance provides steps that should be employed to identify and analyze risks during the enterprise risk-management process, as illustrated in tables 2 and 4.

Table 2. OMB Enterprise Risk-Management Model, Steps 1–3

Step	Description
1. Establish the context	Understand the internal and external environments of the organization.
2. Initial risk identification	Use a structured and systemic approach to recognize where the potential for undesired outcomes or opportunities can arise.
3. Analyze and evaluate risks	Consider the causes, sources, and probability of the risk occurring, the potential positive or negative outcomes; and then prioritize the results of the analysis.

Source: OMB (this chart continues on page 12).

According to FAA officials, the Agency’s approach to risk management was twofold, evaluating risks at both the enterprise¹³ (i.e., the Agency) and program levels. First, the Agency tasked the NextGen Air-Ground Integration Team¹⁴ to

¹¹ Standards for Internal Control, GAO-14-704G (2014).

¹² OMB Circular No A-123, “Management’s Responsibility for Enterprise Risk Management and Internal Control” (July 15, 2016).

¹³ Enterprise risk management is an agency-wide approach to addressing a full spectrum of an organization’s external and internal risks by understanding the combined impact of risks as an interrelated portfolio, rather than addressing them in silos.

¹⁴ The NextGen Air Ground Team reports to the NAS Systems Engineering & Integration Division (ANG-B) under the NextGen Office.

conduct a risk analysis of three¹⁵ NextGen priorities—MRO, PBN, and surface operations—across Agency lines of business.¹⁶ Second, FAA used its Safety Risk Management Process to assign ownership of risk identification to the specific programs, which were to assess the priorities in terms of cost, schedule, and technical risks. FAA officials also stated that they used various processes to monitor implementation progress, including regularly scheduled internal meetings with the NIWG and executive and program-level management.

While FAA’s risk-management process does meet some aspects of OMB’s guidance, we identified a number of drawbacks with FAA’s approach as recommended by OMB. These weaknesses limit the effectiveness of FAA’s process. Specifically:

- **Limited scope and untimeliness.** The risk review FAA conducted after the 2014 NAC report was limited in scope and was not completed until after the Agency began to implement the NextGen priorities. The NextGen Air-Ground Integration Team confined the scope of its review to capabilities with planned milestones during the 2014 and 2015 calendar years. The team’s goal was to ensure completion within a certain timeframe, as directed by FAA executives, even though the key milestones were due to take place through 2017. In addition, FAA issued the report in February 2015, after the milestones were established and implementation of several capabilities was already underway, which affected the review’s usefulness. In contrast, enterprise risk-management standards recommend a more preemptive approach (see table 2, steps 2 and 3), so that significant risks can be identified and fully assessed prior to implementation. By completing the risk review after the start of implementation, FAA had little opportunity to schedule or adjust milestones and capabilities to set more realistic expectations for completion or inform stakeholders of the severity of challenges the initiative would face.
- **Unaddressed interdependencies across priorities.** While FAA’s Joint Implementation Plan and risk report contain broad statements addressing interdependencies that pertain to MRO and PBN, they do not fully address interdependencies across the investment priorities, especially in key areas such as surface operations. Specifically, FAA did not fully examine the complex interdependencies with the wide range of systems needed to boost airport surface operations. The centerpiece of FAA’s surface efforts is the integration of Terminal Flight Data Manager (TFDM), a new estimated \$795 million surface management system designed to introduce electronic

¹⁵ FAA leveraged the existing Acquisition Management System’s (AMS) risk-management processes for DataComm and did not include DataComm in the risk assessment.

¹⁶ FAA is organized into four business areas that work together to meet the Agency’s goal of safe and efficient air travel. The two primary lines of business that are involved with the NextGen priorities initiative are Air Traffic Organization and Aviation Safety.

flight strips¹⁷ into FAA towers and integrate other surface surveillance technologies into one efficient system. TFDM will need to be fully integrated with a wide range of systems that controllers use to manage traffic through all phases of flight.¹⁸ FAA has also not fully assessed the interdependencies associated with sharing 11 airport surface data elements¹⁹ with airline operators through the Departure Reservoir Management (DRM) capability, a key component of the TFDM system to provide measurable surface efficiency improvements. These 11 surface data elements will provide the TFDM system with real-time data-exchanges between FAA and the airlines to improve predictability and efficiency on airport runways. After experiencing delays due to data compatibility issues, two airlines are now able to exchange data with FAA while the remaining airlines are still working to meet the milestone for industry to share the data elements. Without a thorough analysis of interdependencies, FAA may overlook key risks that will impede the implementation progress and the delivery of benefits across the NAS.

- **Lack of involvement of both industry and FAA members at the NIWG level.** Although FAA’s monitoring process tasked the NIWG with discussing risks, it did not incorporate a structured approach for identifying risks that included both industry and FAA representatives throughout the implementation process. Initially, FAA’s NIWG members reported risks to Agency colleagues during internal status meetings. With the exception of the DataComm NIWG group, industry stakeholders stated they were not involved in the risk-identification process at all. According to FAA, it did not establish guidance or have an expectation for its NIWG members to meet with stakeholders to identify risks. Furthermore, FAA stated that it did report internal meeting results to industry stakeholders during monthly NAC subcommittee meetings and tri-annual NAC meetings. Industry stakeholders noted that FAA did not begin reporting risks at NAC subcommittee meetings until December 2015. As a result, those reports occurred too late in the process for stakeholders to provide meaningful feedback that could influence milestone decisions and ultimately the program’s success or failure. Based on

¹⁷ Electronic flight strips replace today’s paper flight progress strips with modern, real-time data-sharing displays for tower controllers. With today’s paper strips, tower controllers must physically hand off a flight progress strip from controller to controller, whereas an electronic version is distributed automatically, reducing controller workload and operational complexity.

¹⁸ TFDM must integrate with Standard Terminal Automation Replacement System (STARS) for traffic in the vicinity of the airport, En Route Automation Modernization (ERAM) for high-altitude traffic, and System Wide Information Management (SWIM) for real-time data sharing among airspace users to improve airport runway situational awareness.

¹⁹ As part of a two-way data-sharing agreement, airlines committed to providing the FAA with 11 surface data elements by October 4, 2015. The elements include Initial Off-Block Time; Earliest Off-Block Time; Flight Intent (intent to enter the movement area prior to the target movement area entry time); Aircraft Gate/Stand; Actual Out/Off/On/In Block Time; Flight Cancellation; and Aircraft Tail/Registration Number.

our observations, the Agency has improved its reporting of risks during NAC meetings since December 2015, although industry stakeholders have requested that FAA highlight issues and potential delays more timely so they can suggest methods for mitigating risks.

FAA Has Not Effectively Assessed the Severity of Risks and How They Might Affect Milestones and Realization of Benefits

FAA did not evaluate the severity of the identified risks to ensure its implementation milestones were realistic and achievable. GAO standards²⁰ state that management should estimate the significance of identified risks—by considering magnitude of impact and likelihood of occurrence—to assess their effect on achieving defined objectives. FAA’s assessment did not effectively evaluate the Agency’s readiness to implement the milestones because FAA overestimated the progress of some of the capabilities. For example, FAA is encountering obstacles in its efforts to use safety technologies for traffic management in order to enhance capacity. A comprehensive risk assessment could have predicted such challenges and resulted in a smoother process.

Specifically, FAA did not sufficiently factor previously known problems when scheduling milestones for some surface operations capabilities. The Agency planned to implement ASSC,²¹ a key system to allow controllers to detect vehicles in the airport movement area, at San Francisco International Airport in September 2014, even though FAA had been aware of safety concerns there since 2010. FAA-identified hazards included air traffic controllers who were unable to view all aircraft and vehicles in the airport movement area; the controllers stated this problem could be solved with airport surface movement radar. FAA officials, however, did not include airport surface movement radar in ASSC’s design. FAA initially relied on its 2010 assessment, which stated the risks were low, but the air traffic controllers were not satisfied that the assessment addressed their concerns. FAA conducted additional tests, increased the risk level of the hazards, and determined that a modification was needed to resolve the safety concerns.²² As a result, FAA delayed implementation for more than a year past the original

²⁰ Standards for Internal Control, GAO-14-704G, 7.05–7.06.

²¹ ASSC is a system that allows air traffic controllers to track surface movement of aircraft and vehicles using radar, multilateration, or satellite technology. For additional information, see our report issued in June 2014: *FAA Operational and Programmatic Deficiencies Impede Integration of Runway Safety Technologies* (OIG Report No AV2014060), concerning FAA’s efforts to implement and integrate surface technologies.

²² FAA approved a final risk assessment in May 2016.

milestone, which had been set for October 2014. While FAA has been responsive to the needed safety changes, it will incur additional costs for training and installation due to these delays.

FAA also did not fully consider the increase in community response about aircraft noise when it implemented new PBN flight procedures. Implementation of a new PBN procedure at Boston Logan International Airport has been delayed due to significant public opposition. FAA was not required by Federal regulations²³ to fully assess the impact of aircraft noise. However, the Agency could have anticipated the high risk due to the heightened level of public interest at other airports located in some western, southern, and southeastern States implementing similar procedures. This risk, in conjunction with others identified in FAA and industry reports—such as controllers' need for automated decision support tools to better manage aircraft in the vicinity of airports—are a threat to PBN's long-term success. FAA officials state that the Agency has actively engaged the Boston area community regarding its PBN efforts for the last 10 years. However, FAA continues to face resistance to these noise issues associated with the new routes. In response to the increase in community opposition to new PBN routes, FAA developed and published a Community Involvement Manual in February 2016 along with the Air Traffic Organization Community Involvement Plan in May 2016. FAA plans to use this manual to improve its outreach efforts for future PBN initiatives.

FAA's continued progress toward completing the milestones is important and significant. However, FAA's robust assessment of the severity of these risks in a comprehensive risk-management plan is critical for the Agency to establish realistic and achievable milestones. The Agency must continue efforts to effectively implement a sound risk-management process to successfully deliver capabilities that are fully operational and provide benefits.

FAA Is Not Consistently and Proactively Mitigating Risks To Keep Implementation on Track

Effective risk management requires dedicated and regularly applied mitigation strategies to reduce the risk of delays and a negative return on benefits. However, FAA is neither proactively nor consistently mitigating risks to ensure key NextGen

²³ Section 213(c)(2) of the FAA Modernization and Reform Act of 2012, referred to as CatEx 2, allows FAA to expedite environmental review of certain air traffic procedures as part of NextGen. CatEx 2 can be applied if FAA determines that PBN procedures "would result in measureable reductions in fuel consumption, carbon dioxide emissions, and noise, on a per flight basis, as compared to aircraft operations that follow existing instrument flight rules procedures in the same airspace."

priorities—particularly with PBN and surface efforts—remain on schedule. This is partly because FAA has not developed a detailed and specific plan to respond to identified risks and monitor progress. In addition, FAA has not fully or transparently reported its progress in implementing these capabilities.

FAA Has Not Established a Detailed Mitigation Plan To Address Identified Risks

To continue progress toward major program milestones, FAA will need to resolve or reduce key risk areas that will materially affect the delivery, capabilities, and benefits of its NextGen priorities (see table 3).

Table 3. Key Risks to NextGen Investment Priorities Implementation and Benefits Delivery

Priority	Key Risk Areas
MRO	<ul style="list-style-type: none"> • Timely completion of safety analysis • Aircraft fleet mix at specific airports
PBN	<ul style="list-style-type: none"> • Community outreach to reduce concerns about aircraft noise • Mixed equipage • Implementation of new automated controller tools to help controllers to manage traffic in the vicinity of airport and limit the impacts of mixed equipage • Effective controller training and use of time based approaches at all facilities
Surface Operations	<ul style="list-style-type: none"> • Execution of the TFDM program for electronic flight strips and other surface management technologies • Complex systems integration issues • Data sharing among airlines to improve surface traffic management
DataComm	<ul style="list-style-type: none"> • Industry cooperation with purchasing and installing new avionics aircraft equipage • Resolving avionics issues with over 700 Boeing 757 and 767 aircraft • Displaying information on controller displays at facilities that manage high altitude traffic by 2019
Cross-cutting/All Priorities	<ul style="list-style-type: none"> • Training for controllers and flight crews • Measurement and realization of benefits • Interdependencies between capabilities

Source: OIG analysis of FAA reports and studies

FAA and industry will need to mitigate several complex risks for capabilities expected for implementation and benefits delivery in the 2019–2020 timeframe. Examples of key risk areas impacting potential schedules and benefits include:

- **Modifying controller equipment and resolving avionics issues with DataComm.** FAA is working to modify controller displays and computers so that controllers managing high-altitude traffic can begin to exchange datalink messages with pilots beginning in 2019. FAA and the airlines cannot reap the expected benefits of rerouting aircraft in bad weather until modifications to controller displays and related equipment are made and fully tested. Also, FAA and industry are working to resolve technical problems with over 700 Boeing 757 and 767 aircraft avionics that cannot transmit and process datalink messages while airborne.
- **Introducing and integrating electronic flight strips for controllers at airport towers.** Surface operations are critical to a more efficient NAS, because inefficiencies on the ground can negate efficiencies gained in the air from new PBN routes and improved runway operations. As mentioned earlier, the centerpiece of FAA's surface efforts is the TFDM program, which will replace paper flight strips with electronic flight strips. FAA plans call for electronic flight strips to be installed at 89 airport towers between 2020 and 2028. According to FAA program officials, risks to the TFDM program include evolving requirements, an aggressive schedule, and complex integration issues with diverse air traffic control systems used through all phases of flight. During this initiative, FAA suffered a series of technical issues, such as frozen screens, that limited controller confidence while testing the electronic flight strips prototype system. Prior to this initiative, similar issues occurred at another airport where the prototype system was tested; FAA officials said it has taken approximately 3 years to stabilize the prototype system. Lessons learned from the previous prototype efforts with electronic flight strips will be valuable in mitigating risks and speeding implementation of the new technology.

As mentioned above, FAA established a plan to monitor risks in 2014 in response to our recommendation. FAA also published a risk report in 2015 identifying some key areas of risk. However, we found that FAA's risk mitigation strategy contains several limitations. OMB guidance provides several risk mitigation elements that should be included in an Agency's risk-management process (see table 4). While FAA's risk report contains some risk-mitigation alternative actions, as OMB recommends, the Agency only presents risk-mitigation options at a high level, and the report does not list detailed actions the Agency could pursue to avoid missing milestones or delaying implementation.

Table 4. OMB Enterprise Risk-Management Model, Steps 4–7

Step		Description
4.	Develop alternatives	Systemically identify and assess a range of risk response options guided by risk appetite.
5.	Respond to risks	Make decisions about the best option(s) among a number of alternatives, and then prepare and execute the selected response strategy.
6.	Monitor and review	Evaluate and monitor performance to determine whether the implemented risk-management options achieve the stated goals and objectives.
7.	Continuous risk identification	Iterative process occurring throughout the year, to include surveillance of leading indicators of future risk from internal and external environments.

Source: OMB (chart continued from p. 7).

For example, the risk report identifies environmental issues as a risk to implementing MRO and PBN at Boston Logan International Airport, but does not offer a specific strategy for mitigating those issues. As of March 31, 2017, FAA had not been able to fully implement the mitigation procedures at Boston Logan International Airport. The risk report also recommends that FAA continue to conduct independent risk analysis and develop an implementation plan for each capability that addresses system integration challenges and plans to deliver benefits. However, FAA has not yet addressed this recommendation.

FAA’s Risk-Mitigation Activities to Date Focus on Postponing Milestones, Rather Than Taking Alternative Actions To Address Risk

As a result of the lack of a detailed risk-mitigation plan, FAA’s risk-mitigation activities to date have been limited to adjusting and removing milestones, rather than seeking alternatives to adjusting milestones. As a best practice example, FAA’s mitigation efforts for DataComm included removing three²⁴ towers from the milestone schedule and replacing them with new locations that could deliver more benefits. However, when identified risks jeopardized other priorities, FAA

²⁴ FAA implemented a downgraded pre-departure clearance capability at these three towers and discontinued tracking them through this initiative.

rescheduled milestones or removed commitments from the implementation schedule while staff developed a solution. For example:

- FAA moved the MRO Wake RECAT implementation milestone at San Francisco International Airport scheduled for the third quarter of 2015 to the second quarter of 2016. The Agency stated the delay was necessary due to resource constraints associated with finishing the Northern California Metroplex and preparing for changes in winter weather traffic flows and the increase of air traffic related to Super Bowl 50. Although FAA did implement this commitment by the revised date, the Agency did not explore other risk-mitigation strategies beyond shifting the milestone even though it was aware of these challenges well in advance.
- FAA moved the milestone for the MRO Dependent Parallel Operations capability at Boston Logan International Airport from an implementation activity in the third quarter of 2015 to a pre-implementation activity in the first quarter of 2016. This commitment is currently on hold pending the completion of an assessment on the impact of aircraft noise.
- FAA removed the milestones for the remaining eight sites planned for ASSC implementation as part of its October 2015 annual update to the Joint Implementation Plan after delays occurred at Cleveland Hopkins International Airport. Although FAA reports that ASSC has been implemented at San Francisco International Airport, the system was not fully operational until October 2016.²⁵ In addition, FAA does not plan to establish new implementation milestones for the remaining eight sites, but later installed ASSC at Cleveland Hopkins International Airport in March 2017.

Furthermore, FAA did not formally document its risk-mitigation activities, which makes it difficult to fully evaluate its strategy and planned response. FAA did not discuss mitigation decisions with NAC executives before adjusting milestones or include industry in its decision-making process, limiting the Agency's ability to mitigate risks and set expectations effectively. For example, FAA shared its risk report with senior management but not with other Agency or industry subject matter experts working on implementation. According to FAA officials, they wanted to keep mitigation decisions confidential, since the Agency bears the ultimate responsibility for program implementation.

²⁵ FAA declared initial operation capability (IOC) on September 21, 2016, while staff was still in the old tower; however, FAA officials did not begin using the system until October 16, 2016, after moving to the new tower.

FAA Has Not Fully or Transparently Reported All Progress, Which May Put NextGen Initiatives at Further Risk and Lead to Unmet Expectations

According to OMB guidance, effectively managing and mitigating risks includes defining progress and being transparent when reporting that progress. Reviews of milestone progress and transparency in reporting milestone status would provide a more realistic picture of the Agency's progress and reveal existing and emerging risks that require better risk management. As noted by the National Academy and our Office, there has been confusion about what FAA's NextGen efforts will deliver and when. Our analysis indicates that while FAA has made progress on completing milestones, FAA has not clearly defined or transparently reported its progress in fully implementing the prioritized capabilities and achieving benefits as described in step 6 of table 4, exposing the Agency to potential additional risk and unmet expectations. For example:

- **Milestone completion reports overstate FAA's success.** Of the 147 milestones FAA reported as completed through March 2017, most were attributed to the implementation of two commitments, Wake RECAT at 12 airports and DataComm at 55 towers. FAA reported the success of Wake RECAT under the NextGen umbrella, although stakeholders point out it is a procedural effort and not a new NextGen capability or technology. In addition, FAA implemented Wake RECAT at Cincinnati/Northern Kentucky International Airport and Atlanta Hartsfield-Jackson Airport before the implementation plan was established or published, although it lists the two airports in its milestone progress as a success.
- **Limited benefits have been achieved to date.** FAA is still working to determine whether benefits have been realized at some locations, even though FAA previously reported that implementing the capabilities in these locations would result in significant benefits. The Agency did not develop a mechanism for measuring benefits in advance to ensure the locations selected for implementation would realize benefits as expected. Consequently, FAA implemented capabilities at some locations that have yet to yield benefits. For example, FAA implemented Wake RECAT at LaGuardia and Chicago Midway International Airports, yet the Agency reported that Chicago Midway International yielded negative benefits in terms of arrivals and expects minimal benefits at LaGuardia Airport due to the aircraft fleet mix. Also, a post-implementation report completed by the MITRE Corporation indicated that the Northern California Metroplex yielded negative fuel savings in the months after the introduction of new PBN procedures. According to

FAA officials, the problems occurred because controllers at the Metroplex did not always use the PBN procedures initially, but they are currently doing so. Also, FAA can anticipate limited benefits from the Atlanta Metroplex that was implemented in December 2016 due to a partial suspension of some of the PBN procedures to mitigate safety issues. FAA is undergoing a redesign effort of the Atlanta Metroplex and plans for full implementation to occur by October 2017.

To get a better handle on benefits, FAA and industry formed the Joint Analysis Team (JAT) in August 2015 to evaluate the impact and benefits of selected NextGen capabilities, such as Wake RECAT and PBN. Although the JAT's results have been useful, the team's tasks have been limited to a review of five Wake RECAT locations and one PBN implementation.²⁶ Since FAA is still developing metrics for measuring capacity enhancements, it is too soon to determine if the full range of benefits have been delivered from the capabilities implemented thus far.

- **FAA's reporting of "implemented" milestones is misleading.** FAA still faces challenges communicating the status of some capabilities to the NAC and the public. Although FAA categorizes commitments as "implemented" on its public website, we determined that capabilities at some locations are not yet fully operational. In addition, FAA's definition of "implemented milestone" is fluid and includes both initiated and halted activities. For example, according to FAA, it "completed" installation of flight strips at Newark Liberty International Airport in April 2016, although it discontinued their use shortly thereafter due to software instability issues. Since installation of the flight strips at San Francisco International Airport and McCarran International Airport in 2016, FAA has not operated the flight strips system at all, though the Agency shows the milestone as "implemented." FAA does not plan to restart flight strips at these locations until the new system becomes available through the TFDN program in 2021. FAA also categorized ASSC at San Francisco International Airport as implemented in September 2014 because the data were available, although the equipment was not operational until over 2 years later in October 2016. Reporting these capabilities as implemented when they are not yet fully operational could erode stakeholders' confidence in the Agency's efforts, particularly when the focus is on full operational implementation and achieving realistic benefits.

²⁶ As of February 2017, the JAT has evaluated Wake RECAT at Charlotte Douglas International Airport, Chicago O'Hare International Airport, Chicago Midway International Airport, Indianapolis International Airport, and Philadelphia International Airport. The JAT also evaluated the PBN Established on Required Navigation Performance at Denver International Airport.

Moving forward, it will be critical for FAA to address key risks and place more focused efforts toward risk-management planning and execution to better manage milestone adjustments, clearly define progress, set realistic expectations for implementation, and achieve the full range of benefits from this initiative. In the Agency's recently established 3-year rolling implementation plan,²⁷ FAA and industry agreed to monitor joint progress and be agile and flexible to make necessary adjustments to commitments. At the same time, FAA and industry have agreed to continue the NIWG process and increase their communication and collaboration.

Finally, as indicated in the Agency's status updates to address our open recommendation from our previous report, FAA has agreed to finalize and document its risk mitigation strategy to better manage existing and emerging risks. To fully satisfy that recommendation, FAA should ensure that the following concepts, drawn from OMB guidance, are included in its risk-mitigation strategy:

- Evaluating risk severity against scheduled milestones;
- Involving industry stakeholders to enhance risk mitigation options;
- Developing alternatives for risk mitigation;
- Defining progress to accurately measure success; and
- Assessing risks to achieving anticipated benefits by airport location.

Conclusion

FAA has made progress implementing the NAC's top-priority capabilities, particularly the use of parallel runways and DataComm's tower services. However, the success of future NextGen efforts for PBN and improving surface operations, including introducing electronic flight strips in the tower environment, hinges on FAA's ability to mitigate risks with industry and incorporate sound risk-management practices into its implementation efforts. A more comprehensive risk-management process that involves all stakeholders will help the Agency realize its overall goal of delivering capabilities that provide benefits to airspace users. Until FAA's mitigation strategies are properly aligned with identified risks and the Agency identifies a range of alternatives to respond to these risks, FAA will have difficulty setting and meeting expectations for its NextGen goals in the near and long term.

²⁷ In October 2016, FAA issued the NextGen Priorities Joint Implementation Rolling Plan 2017–2019, which will be updated annually at the beginning of each fiscal year and rolled forward biannually with capabilities in the four prioritized areas that will enhance controller productivity and increase predictability, airspace capacity, and efficiency.

Recommendations

In our November 2014 report, we recommended FAA develop a risk-mitigation strategy for missed milestones or when commitments change. Based on the results of this review, we believe that FAA has not taken actions to fully satisfy that recommendation. FAA provided a target action date of September 30, 2017, to satisfy the remaining open recommendation in the November 2014 report. For further details about the status of this recommendation, see below.

Agency Comments and OIG Response

We provided FAA with our draft report on August 15, 2017, and received its response on September 13, 2017, which is included as an appendix to this report. In its response, FAA requested that we close our open recommendation from 2014, stating that the Agency is fully compliant with our risk management recommendation and that it plans to update the NextGen Priorities Joint Implementation Plan Oversight Process document. Based on FAA's response, we consider the recommendation resolved but open, pending our receipt and review of FAA's revised oversight process.

In its formal response, FAA also expressed concerns with a number of findings in this report, which we address as follows.

First, FAA stated that we used the fact that the Agency missed milestones as the basis for our finding that the Agency did not focus sufficient attention on risk mitigation for the NextGen investment priorities. This is not the case. As noted in our report, our review focused on the Agency's overall process and steps it took with industry to develop a Joint Implementation Plan, among other tasks. Further, meeting milestones (while important) does not necessarily translate into the realization of benefits for airspace users or indicate successful risk mitigation, as evidenced by FAA's challenges with PBN at some high-activity airports. As FAA states, the NextGen capabilities were selected due to their high readiness for implementation. However, as our report points out, PBN, DataComm, and Surface Operations will face complex risks that will need to be mitigated in the 2019 timeframe to deliver benefits and meet industry and Congressional expectations. Meeting milestones is only one component of addressing these risks.

Second, FAA stated that the Agency's issues with ASSC, its airport surface management capability, were not a failure with risk management and were largely unforeseen. According to FAA, the Agency and industry stakeholders jointly agreed to remove the commitment due to newly identified risks. However, as noted in our report, FAA's own risk management studies and our discussions

with FAA controllers demonstrate that the Agency identified technical and design issues with ASSC as early as 2010. Additionally, during our observations of the NAC subcommittee meetings, we observed that industry stakeholders were not aware of the commitment being removed before FAA's announcement at a meeting. Our concern is with FAA's decision to maintain the scheduled milestone and make no adjustments before publishing the Joint Implementation Plan, despite knowing that ASSC would not be implemented as originally scheduled or designed. We adjusted our report to emphasize this concern.

Finally, FAA stated that all Agency programs include detailed risk management plans, which are developed and executed per its acquisition policy. While we acknowledge that individual programs have individual plans, we note that FAA did not establish an overarching risk management strategy specifically for the capabilities under the umbrella of the NextGen priorities or communicate to stakeholders how risks could impact the realization of benefits. As we wrote in our report, the Agency's own risk report specifically recommended FAA develop a detailed mitigation plan and a benefits assessment for these capabilities. FAA has yet to address this recommendation with such a plan.

Actions Required

As noted above, we consider our 2014 recommendation resolved but open until we receive and review FAA's updated NextGen Priorities Joint Implementation Plan Oversight Process document.

We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-0500 or Nathan Custer, Program Director, at (202) 366-5540.

Exhibit A. Scope and Methodology

We conducted our work from November 2015 through August 2017 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.

To assess FAA's process for identifying risks to implementing the four prioritized NextGen capabilities, we obtained and reviewed the NextGen Priorities Joint Implementation Plan dated October 2014. We then calculated how many planned implementation commitments for each priority had been completed. We reviewed risk documents developed by FAA, such as the "NextGen Priority Joint Implementation Plan Risks and Mitigations Report" dated February 2015 and Safety Risk Management documents that identified risks associated with the implementation of the capabilities. We interviewed key officials and stakeholders (see exhibit B) to evaluate FAA's identification and oversight of risks to the prioritized capabilities. We visited or contacted select air traffic facilities (see exhibit B) with the highest number of capabilities implemented or that had known implementation issues to determine the impact of FAA's risk-mitigation process and missed milestone commitments on facility implementation of the four NextGen prioritized capabilities. We also analyzed key risks to the NextGen capabilities that had been identified in FAA reports and studies.

To assess FAA's actions to identify and mitigate risks—specifically, the Agency's progress in implementing the four capabilities in the context of identified risks—we obtained and reviewed minutes and observed monthly NAC subcommittee and full NAC meetings between August 2014 and June 2017. We interviewed key officials and stakeholders and visited or contacted select air traffic facilities (see exhibit B) to determine how effective FAA's risk-mitigation process has been or if it could be improved. In addition, we analyzed the delays and milestone adjustments to the NextGen Joint Implementation Plan and calculated the number of commitments with delays and the number of milestones that were adjusted (removed or revised) to understand the impact on the implementation of the prioritized commitments.

Exhibit B. Organizations Visited or Contacted

Federal Aviation Administration

Air Traffic Organization

NextGen Integration Working Group Subject Matter Experts

Office of NextGen

Program Office

NextGen Advisory Committee

NextGen Advisory Committee Subcommittee Members

NextGen Integration Working Group Subject Matter Experts

Air Traffic Facilities

Hartsfield-Jackson Atlanta International Airport Air Traffic Control Tower

Atlanta Terminal Radar Approach Control

Northern California Terminal Radar Approach Control

San Francisco International Airport Air Traffic Control Tower

Cleveland Hopkins International Airport Air Traffic Control Tower

Newark Liberty International Airport Air Traffic Control Tower

John F Kennedy International Airport Air Traffic Control Tower

Phoenix Airport Traffic Control Tower

Other Stakeholders

Aircraft Owners and Pilots Association

Lockheed Martin

MITRE Corporation

RTCA

Exhibit C. List of Acronyms

ASSC	Airport Surface Surveillance Capability
DataComm	Data Communications
DOT	Department of Transportation
DRM	Departure Reservoir Management
FAA	Federal Aviation Administration
GAO	Government Accountability Office
JAT	Joint Analysis Team
MRO	Multiple Runway Operations
NAC	NextGen Advisory Committee
NAS	National Airspace System
NextGen	Next Generation Air Transportation System
NIWG	NextGen Integration Working Group
OIG	Office of Inspector General
OMB	Office of Management and Budget
PBN	Performance-based Navigation
SWIM	System Wide Information Management
SVT	Surface Visualization Tool
TRACON	Terminal Radar Approach Control
TFDM	Terminal Flight Data Manager
Wake RECAT	Wake Recategorization

Exhibit D. NextGen High-Priority Joint Implementation Plan Commitments

Commitments	Description
Multiple Runway Operations (MRO)	
<i>FAA Implementation Commitment</i>	
Dependent Parallel Operations (2,500'-3,600')	Reduces the dependent stagger separation from 1.5 nautical miles (NM) to 1.0 NM for runways separated by more than 2,500 feet and less than 3,600 feet.
Dependent Parallel Operations (Runways > 4,300')	Reduces the dependent stagger separation from 2.0 NM to 1.5 NM for runways greater than 4,300 feet and shorter than approximately 7,300 feet.
Dual Independent Parallel Operations	Allows dual simultaneous operations for runways spaced greater than 3,600 feet using either instrument landing system or GPS-based approach options with vertical guidance.
Dual Independent Operations with Offset	Allows dual simultaneous operations with use of an offset for runways spaced greater than approximately 3,000 feet.
Triple Independent Parallel Operations	Allows triple simultaneous operations for runways spaced greater than approximately 3,900 feet.
Wake Recategorization Phase 1	Newly approved wake turbulence categories that group aircraft more optimally based on their wake turbulence characteristics and the current fleet mix for U.S. airports. Later, combined with phase 2 in order for the program to implement automation changes as they become available at the identified locations.
Wake Recategorization Phase 2	Defines pair-wise wake separation standards for each aircraft leader-follower pair providing unique benefits beyond phase 1. Later combined with phase 1.
Apply Order 7110.308 to Additional Airport	Allows a reduction in the required wake separations for dependent operations for runways spaced less than 2,500 feet apart when small or large category aircraft are leading in the dependent pair. Later moved to pre-implementation commitment due to community concerns about environmental noise.
<i>FAA Pre-Implementation Commitment</i>	
Assessment of Future Wake Recategorization Capabilities	Assess future Wake Recategorization capabilities at additional sites.
Assessment to Implement Order 7110.308 and Dependent Parallel Operations (2,500' – 3,600')	To maintain visibility on the projects, a pre-implementation commitment for an assessment of implementing has been added to the plan (see above).
Final Investment Decision for Wake Turbulence Mitigation for Departures (WTMD)	Permits any aircraft to depart from the "upwind" runway without waiting 2 or 3 minutes after heavy or B757 aircraft depart the "downwind" runway.

Commitments	Description
Safety Analysis for Wake Turbulence Mitigation for Arrivals—Procedures	Allows a reduction in required wake separations for dependent operations for runways spaced less than 2,500 feet apart when heavy or B757 aircraft are leading in the dependent pair.
Safety Analysis of Order 7110.308 for Additional Airport	FAA will assess whether this order (described above) can be applied to the San Francisco International Airport for runways 19 left and 19 right.
Performance-Based Navigation (PBN)	
<i>FAA Implementation Commitment</i>	
Metroplex Projects	FAA study teams and aviation community experts analyze the operation challenges of a given metroplex area and explore the available tools for improvement. Collaborative design and implementation teams then put in place solutions, including PBN procedures.
Established on Required Navigation Performance Authorization Required (EoR RNP AR—Widely Spaced Operations)	Enables controllers to clear aircraft on an RNP approach while on the downwind to the airport without the need to use the standard 1,000 feet of vertical separation when the aircraft turns to align with the runway centerline. Align to runway closer to the field, reducing track miles, fuel burn, and noise.
<i>FAA Pre-Implementation Commitment</i>	
Equivalent Lateral Spacing Operations (ELSO) National Standard	Capitalizes on the increased navigational precision of RNAV departure operations to provide a reduced divergence angle while maintaining the established minimum lateral spacing between departure paths.
Established on Required Navigation Performance Authorization Required (EoR RNP AR—Widely Spaced Operations) National Standard	FAA commits to publishing a national standard, which will implement EoR for widely spaced operations and eligible locations throughout the NAS.
Established on RNP (EoR) Track-to-Fix (TF) of Fly-By Approaches Safety Analysis	FAA to research the use of RNP approaches using Track-to-Fix legs/fly-by turn construction and conducted as simultaneous, independent operations.
Single Site Assessment of Las Vegas Basin	FAA will assess if the Las Vegas Basin is a viable site for a single site PBN location.
Surface Operations and Data Sharing	
<i>FAA Implementation Commitment</i>	
Advanced Electronic Flight Strips (AEFS)	Replaces paper “flight process strips” with modern, real-time data-sharing displays for tower controllers. Improves coordination among controllers, traffic management units, and front line managers by electronically displaying updated data for flights.
FAA To Ingest 11 Data Elements via TFMS Update	As part of a two-way data-sharing agreement, FAA commits to ingesting the 11 data items industry has committed to provide to FAA’s new modeling capabilities.
Surface Departure Management	A feasibility assessment for Terminal Flight Data Management (TFDM) resulted in adding a new implementation for surface departure management in Charlotte (see below).

Commitments	Description
Surface Surveillance Event Data Distribution to Users via SWIM (ASDE-X/ASSC)	Continued expansion of the distribution for Airport Surface Detection Equipment-Model X (ASDE-X)/Airport Surface Surveillance Capability (ASSC) surface event data to external users.
System Wide Information Management (SWIM) Surface Visualization Tool (SVT) Deployment	Improves FAA's ability to monitor aircraft departure buildups and better plan for airport reconfigurations due to changing weather.
Traffic Flow Management System (TFMS) & Time-Based Flow Management (TBFM) New Data Sharing via SWIM Subscription	Expanding distribution of real-time NAS data, including information regarding TFMS traffic management initiatives, the National Traffic Management Log airport configurations with arrival rates, and thunderstorm forecast data from FAA's Route Availability Planning Tool.
FAA Pre-Implementation Commitment	
Feasibility Assessment for Electronic Flight Data for New York Advanced Electronic Flight Strips (AEFS)	Assessment for introducing the AEFS capability to New York airport towers. Includes examining the technical considerations associated with introducing AEFS software and hardware into the New York tower operation, including connectivity to New York's Departure Sequencing Program (see above).
Feasibility Assessment for TFDM Program Departure Management	Assessment of the TFDM departure management capability, as well as a strategy update, to coincide with the Planned FAA Joint Resources Council review of the TFDM program.
Industry Commitment	
Industry To Provide 11 Data Elements	As part of a two-way data-sharing agreement, industry commits to providing the FAA with 11 new data elements: Initial Off-Block Time; Earliest Off-Block Time; Actual Off-Block Time; Actual Takeoff Time; Actual Landing Time; Actual In-Block Time; Target Movement Area Entry Time; Aircraft Tail/Registration Number; Flight Cancellation; Flight Intent (to leave gate early); and Gate Assignment.
Airport Operators as Collaborative Decision Making (CDM) Participants	Determine whether to include airport operators as signatories on agreement to provide real-time information for better gate management and utilization, forecasting of airport resource demands, and preparing for irregular operations, severe weather operations, and diversions.
Time-Based Flow Management (TBFM) "Wheels Up" Procedural Change Using New "Earliest Off-Block Time" Data Element	Assess if creating procedures for use of industry's Earliest Off-Block Time surface data element will improve "wheels up" time for short-haul flights into a TBFM-metered airport.
Simplifying Application for SWIM Data	Provide recommendations for simplifying the acceptance process when applying for access to SWIM data via a connection to the National Enterprise Security Gateway.

Commitments	Description
Data Communications (DataComm)	
<i>FAA Implementation Commitment</i>	
Departure Clearances at 56 Airports	Deliver Tower Data Link Services (TDLS) software and hardware enhancements to enable departure clearance services; En Route Automation Modernization (ERAM) software and hardware enhancements, including log-on and session establishment; and Data Communications Network Service (DCNS), which will provide the air/ground communications network services infrastructure.
<i>FAA Pre-Implementation Commitment</i>	
Extended Departure Clearance Operational Trials	Extend Departure Clearance (DCL) Operational Trials at Memphis International Airport and Newark Liberty International Airport for 15 months to refine operational procedures and collect valuable operational data.
Final Investment Decision (FID) for En Route Services	If DataComm segment 1, phase 2 en route services are approved, phase 2 will leverage the phase 1 infrastructure to deliver services to the en route domain, including Controller Pilot Data Link Communications (CPDLC) airborne weather and other reroute capabilities.
<i>Industry Commitment</i>	
Airlines To Equip 1,900 Aircraft	FAA established the Avionics Equipage Initiative to encourage early equipage of 1,900 aircraft by 2019 to provide enough aircraft to realize operational benefits.
Recorder Rule for Retrofit	The Performance Based Aviation Rulemaking Committee's (PARC) Communication Working Group will develop recommendations and supporting rationale for revisions to the recorder rule that defined data-link recording requirements for new aircraft, and for any prior aircraft that install a data-link capability to address operator concerns regarding cost of retrofits and the resultant impediments to equipping NextGen technologies.
Assessment of Boeing 737 Flight Management Computer Issue	A thorough examination of limits aboard the Boeing 737, which cannot handle airway-to-airway route constructs when uplinked without a published waypoint at the airway intersection point. This could limit or prevent the use of some DataComm services.
Feasibility Assessment of VHF Digital Link (VDL) Mode 0	The DataComm program has focused on implementation of air-ground data link utilizing VHF Digital Link Mode 2 (VDL Mode 2). Today, airline communications are supported on VDL Mode 0 and VDL Mode 2. FAA will work with industry to investigate the effect on network performance for accommodating VDL Mode 0 and media other than VDL Mode 2 in en route airspace.

Exhibit E. Major Contributors to This Report

NATHAN **CUSTER**

PROGRAM DIRECTOR

BARRY **DEWEESE**

PROGRAM DIRECTOR

NELDA **SMITH**

PROJECT MANAGER

SEAN **WOODS**

SENIOR AUDITOR

SUSAN **CROOK-WILSON**

SENIOR ANALYST

WAYNE **VAN DE WALKER**

SENIOR AUDITOR

AUDRE **AZUOLAS**

SENIOR TECHNICAL WRITER

JANE **LUSAKA**

WRITER/EDITOR

AMY **BERKS**

SENIOR COUNSEL

Appendix. Agency Comments




Federal Aviation Administration

Memorandum

Date: September 13, 2017

To: Matthew E. Hampton, Assistant Inspector General for Aviation Audits

From: H. Clayton Foushee, Director, Office of Audit and Evaluation, AAE-1 

Subject: Federal Aviation Administration's (FAA) Response to Office of Inspector General (OIG) Draft Report: FAA Has Made Progress Implementing NextGen Priorities, but Additional Actions Are Needed to Improve Risk Management

The OIG draft report acknowledges that the FAA has met the commitment milestones for 147 of 158 (93 percent) of its NextGen priority commitments. The OIG, however, focuses upon the 7 percent of delayed milestones to conclude that FAA has not adequately accounted for risk in establishing program milestones. The agency disagrees. As further described below, the FAA assessed and considered risk when selecting NextGen Priorities. Furthermore, as programs mature and get closer to deployment, the identification of previously unidentified risks is not uncommon in the development of new technology.

The FAA tasked the NextGen Advisory Committee (NAC) with reviewing the agency's plans for NextGen implementation and with recommending investment priorities. From the beginning, the NAC selected high-benefit, high-readiness items as their top NextGen priorities. The priorities recommended by the NAC— multiple runway operations, performance-based navigation, surface operations, and data communications (Data Comm) — were chosen based upon the benefits to National Airspace System users, technological maturity, and implementation readiness.

By definition, the NextGen Priorities selection process placed an emphasis upon detailed risk analyses previously conducted by the FAA. The results of agency risk management analyses validated a high level of readiness for the priorities ultimately selected. In short, program readiness based upon effective risk management studies drove the industry selection process.

We offer the following comments in response to the other assertions and findings in the draft report:

- Issues with the Airport Surface Surveillance Capability (ASSC) were not a failure of risk management. As a result of multiple internal program reviews, ASSC was redesigned to mitigate hazards identified by FAA risk management analyses that were unforeseen by both industry and FAA at the time of initial selection. These newly identified risks were

explained to industry stakeholders, along with the need to redesign the program. As a result, FAA and industry jointly agreed to remove the earlier commitment.

- All FAA programs include detailed risk management plans, which are developed and executed per Acquisition Management System (AMS) policy. The OIG states that Data Comm and Surface Operations could be jeopardized by a lack of detailed risk mitigation plans. However, both Data Comm and the Terminal Flight Data Manager programs have detailed risk mitigation plans in place. The FAA does not agree that additional risk mitigation processes within the NAC framework would serve the industry's best interests. Risk management is applied throughout the lifecycle management process to identify and mitigate risks.
- Wake Recat has been funded by the FAA's NextGen program for eight consecutive years and remains a NAC priority. Wake Recat, in conjunction with Data Comm, have provided tangible operational benefits, and both are top NAC priorities. We understand that in some instances, the delivery of implementation commitments do not always result in immediate operational benefits. However, Wake Recat is an example where implementation has resulted in tangible operational benefits. To achieve tangible operational outcomes, the FAA and industry are working, through the NextGen Priorities Integration Working Group, to complete implementations and overcome operational integration challenges.

In response to the 2014 OIG audit on the same subject, the FAA's October 31, 2014, management response stated that the agency was already fully compliant with the OIG's recommendation on risk management, and we maintain that the open recommendation should have been closed, but has been unnecessarily carried forward in the current audit. As further noted in updates to the OIG since 2014, it is standard operating procedure to continually strengthen risk management processes in partnership with industry, and process improvement must be a continuing effort without an end date. Thus, we again request closure of this open recommendation based upon the latest updates to the NextGen Priorities Joint Implementation Plan Oversight Process. This document will be issued by September 30, 2017.

We appreciate this opportunity to respond to the OIG draft report. Please contact H. Clayton Foushee at (202) 267-9000 if you have any questions or require additional information about these comments.

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1200 New Jersey Ave SE
Washington, DC 20590



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