May 16, 2017

The Honorable John Thune
Chairman
Committee on Commerce, Science
  and Transportation
United States Senate
511 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Thune:

The purpose of this letter is to provide Airlines for America's (A4A) perspective and overview on the status of the Federal Aviation Administration's (FAA) progress on implementing the Next Generation Air Transportation System (NextGen).

This letter offers a different narrative on the progress of NextGen than what was put forth by the FAA in a recent press release indicating the Agency had spent $7.5 billion on NextGen over the past seven years and that the investment has resulted in $2.7 billion in benefits to passengers and the airlines to date, and is expected to yield more than $160 billion in benefits through 2030.[1]

We want to be absolutely clear in the fact that our criticisms on the pace and implementation of NextGen are in no way directed at the talented and hardworking FAA employees working on the projects and programs. Rather, it is the overarching governance and funding structure of the FAA that inhibits the planning and effective implementation of sophisticated air traffic control (ATC) technologies. Dedication and hard work can only get you so far when the system that governs and funds your operation is hopelessly dysfunctional.

Some progress on NextGen has been made, but too slowly and more needs to be done.

Too often the FAA has adopted the practice of claiming success when either a technology deployment is completed or a programmatic milestone is met without acknowledging the fact that the accomplishment amounted to little to no benefit to users of the aviation system.

What we all agree on is that FAA has spent $7.5 billion on NextGen over the past seven years. What we do not agree on is the presumption that the program has created $2.7 billion in benefits.

The actual NextGen reality is best captured in the May 2015, National Academy of Sciences (NAS) report[2] on NextGen which minced no words in saying that the FAA was not delivering the system that was promised. The 77-page NAS report says:

- The original vision for NextGen is not what is being implemented today;
- This shift in focus has not been clear to all stakeholders;
- Not all parts of the original vision will be achieved in the foreseeable future;
- NextGen as currently formulated is not broadly transformational; and
- NextGen has become a misnomer.

[1] https://www.faa.gov/news/press_releases/news_story.cfm?newsId=21435

[2] http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=21721

FAA is overstating the benefits of NextGen to the airline community in multiple ways.

As the Department of Transportation (DOT) Inspector General (IG) has noted, FAA is understating or at least underestimating the costs. By underestimating the costs, they are artificially inflating the benefit/cost ratio or return on investment (ROI). FAA's own NextGen business case, last updated in July 2016, states that "The estimated retrofit costs…do not include the opportunity cost of taking an aircraft out of service or ancillary costs, such as training." And, as the IG observed on Sept. 30, 2016 --

> "FAA originally estimated that NextGen would cost about $40 billion—$20 billion from the Federal government and $20 billion from system users. However, in 2009, a Joint Program and Development Office (JPDO)-commissioned analysis cautioned that the NextGen capabilities planned for 2025 could cost the Government and airspace users significantly more, with costs potentially reaching over $100 billion. In FAA's July 2016 business case, the Agency projected that NextGen would cost over $35 billion through 2030—$20.6 billion for FAA and $15.1 billion for airspace users. However, our work has shown that there are a number of uncertainties. For example, FAA has not fully identified the total costs or number of segments for the six NextGen transformational programs. Additionally, there are other factors that will materially impact the overall cost of NextGen as well as the near- and long-term modernization and maintenance of the national airspace system. These include controlling cost growth when acquiring new major systems, identifying and preventing cybersecurity risks, improving national airspace system resiliency, and integrating unmanned aerial systems (UAS)."

FAA's definition of "NextGen" has evolved to include many programs that were in place years if not decades prior to the advent of NextGen and that do not require either FAA or airspace users to equip with any new technologies. Though some of these programs do yield important benefits, they cannot accurately be classified as NextGen and thus should not be included in the benefits calculus. Examples are Airport Surface Detection Equipment Model X (ASDE-X), Improved Multiple Runway Operations (IMRO), expanded low-visibility operations using lower runway visual range (RVR) minima, and Wake Turbulence Recategorization (RECAT), all of which go back several decades and are a function primarily of procedural changes rather than deployment of technology. These non-NextGen programs account for 15 percent of the $13.2 billion in lifecycle (2010-2030) "benefits of completed improvements" being touted by the FAA.

When speaking about the benefits of NextGen, FAA typically speaks of benefits in totality, rather than specifically to the airline community. That is not incorrect, but it masks the relatively small portion of the total benefit that accrues to airlines, making it seem like the airlines are receiving a substantial return on their investment. In particular, the $160 billion in total lifecycle NextGen benefits often shared by FAA with media and Congress include benefits to the general aviation community, to passengers and to the environment. Again, it is not wrong to quantify those things, but failing to split them out makes the endeavor less transparent and, at times, misleading. Of the $13.2 billion in "benefits of completed improvements," for example, only $4.2 billion, or 32 percent, is estimated to be realized by the aircraft operators themselves. The lion's share of estimated benefits are a function of hypothetical passenger value of time, assuming that delays are truly avoided relative to some projected future baseline of delays.

It is also inaccurate to say that $2.7 billion in direct benefits have been delivered. No one has actually measured $2.7 billion in benefits. Instead, FAA has used a "model" to predict what would be delivered through 2016. In fact, the one real "measurement" of benefits that has been attempted is through the work of the FAA-NextGen Advisory Committee (NAC) Joint Analysis Team (JAT) who did actually attempt to measure fuel burn and other efficiencies in the North Texas Metroplex. Their preliminary findings suggest the benefits were negligible and in some cases could be negative.

FAA has also estimated unrealistically large benefits for even those programs that are yielding direct benefits to airlines. For example, of the $0.9 billion ($917 million) in 2010-2016 estimated "benefits to airspace users", FAA indicates that $328 million, or 36 percent of that amount, was derived from the supposedly successful deployment of Time-Based Flow Management (TBFM) in the national airspace

system. However, as noted in greater detail later in this letter, TBFM is not consistently used by air traffic control facilities across the system due to a failure to integrate TBFM into traffic flow management systems and inadequate staffing at facilities to consistently support its use. The lack of integration and execution is especially concerning to the industry because we are extremely supportive of the TBFM capability and view its success as a fundamental enabler and integral part of making NextGen a reality.

Finally, many of the benefits claimed by FAA capture flight efficiencies (often fuel savings) but not system-wide traffic flow management benefits. Many efficiencies or "savings" at the flight level actually result in disbenefits (i.e., delays) elsewhere, and these are not being measured by FAA's benefits model and are thus not reflected in its business case documents or public statements. As noted, the preliminary findings of the FAA-NAC JAT with respect to the North Texas Metroplex constitute just one example of this phenomenon.

FAA lacks an integrated master plan for NextGen.

The FAA's claims that everything is fine and NextGen is on track runs counter to nearly 15 years' worth independent audits and reports including those of the DOT IG and the NAS report. As outlined below, less than four months ago the IG stated, "FAA has not adjusted anticipated benefits for its transformational programs, and many benefits remain unquantified, broad, or uncertain for improving the flow of air traffic and reducing Agency operating costs." The previous year the NAS report stated that "FAA was not delivering the system that was promised and that the agency should "reset expectations" for the program since the original vision for NextGen is not what is being implemented today." The FAA rhetoric does not match reality.

Notably, in 2012, the IG wrote that FAA lacks an integrated master schedule for all the transformational programs to better coordinate how program capabilities—many of which are interdependent—will be implemented. Without this essential planning tool, it will remain difficult for FAA to fully prioritize which transformational program capabilities will provide users with the greatest benefits or make trade-offs between program requirements when necessary. FAA also has yet to address complex integration issues with its automation systems to enhance flight data processing and its telecommunications infrastructure.

Even in the FAA response to the Commerce Committee they state "Where we have stumbled, we have had the flexibility to work with our stakeholders to learn lessons, reassess, and regroup." For a new program this type of statement would be normal, but we are nearly two decades into NextGen, why are we learning the same lessons repeatedly and how many independent reports do we need to read before we acknowledge a transformational change needs to happen in regards to how we operate and manage our ATC system?

The lesson that should be learned is that the narrative around NextGen should be a clarion call for ATC reform, not an endorsement of the status quo. Time has shown that FAA needs funding certainty, personnel/hiring flexibility and governance guidance to perform the task of a systems integrator for a huge project so critical to our modern economy.

A Brief History of NextGen.

The Vision 100 – Century of Aviation Reauthorization Act, signed into law in December 2003, endorsed the concept of NextGen. The following month, the DOT Secretary announced plans for a new, multi-year, multi-agency effort to develop an air transportation system for the year 2025 and beyond and subsequently established the JPDO at FAA comprising representatives from FAA, the National Aeronautics and Space Administration (NASA), DOT, Homeland Security, Commerce, and the White House Office of Science and Technology Policy to create and carry out an integrated plan for NextGen. On December 15, 2004, DOT unveiled the Integrated Plan for the Next Generation Air Transportation System, which laid out goals, objectives, and requirements necessary to create the NextGen system.[3]

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[3] https://www.faa.gov/about/history/brief_history/#nextgen

Since that time, some common themes have governed NextGen implementation, most notably the lack of a comprehensive integrated plan and the lack of clearly defined goals that intertwine the interdependencies of multiple programs. Some report excerpts below --

- July 2005 – <u>DOT IG Audit Announcement – FAA's JPDO</u>. "FAA published the Next Generation Air Transportation System Integrated Plan for the JPDO in December 2004. However, the plan did not specify what new capabilities would be pursued or how much they would cost. Moreover, recent congressional hearings underscored the need for actions that can materially improve how air traffic is managed well before the 2025 timeframe. A clear understanding of funding requirements for the new office (and how they will be paid for) will be important as Congress prepares to reauthorize FAA programs and explores financing mechanisms."[4]

- July 2006 – <u>DOT IG Testimony on Perspectives on the Progress and Actions Needed to Address the Next Generation Air Transportation System. Examining and Overcoming Barriers to Transforming the National Airspace System That Have Affected Past FAA Programs.</u> "Our work on many major acquisitions shows the importance of clearly defined transition paths, having expected costs (for both FAA and airspace users), and determining benefits in terms of reduced delays. This is particularly the case for initiatives that require airspace users to equip with new avionics."[5]

- February 2007 – <u>DOT IG Report on Joint Planning and Development Office: Actions Needed To Reduce Risks with the Next Generation Air Transportation System. Summary of Recommendations.</u> "Our recommendations focus on actions FAA and the JPDO need to take to establish cost estimates, quantify benefits, align research between agencies, develop a service roadmap, reduce risk with next generation initiatives, and to speed the introduction of new capabilities into the national airspace system."[6]

- April 2008 – <u>DOT IG Report on ATC Modernization: FAA Faces Challenges in Managing Ongoing Projects, Sustaining Existing Facilities, and Introducing New Capabilities.</u> "FAA's ATC modernization effort has a long history of cost growth, schedule delays, and unmet expectations that we have chronicled in numerous reports. In May 2005, we reported that 11 of the 16 projects we reviewed would experience a total cost growth of about $5.6 billion. Moreover, 9 of the 16 experienced schedule slips from 2 to 12 years. Problems are traceable to complex software development, overambitious plans, changing requirements, and poorly defined cost estimates. It will be important for FAA to avoid these problems as it moves forward with NextGen."[7]

- March 2009 – <u>DOT IG Testimony on FAA: Actions Needed to Achieve Mid-Term NextGen Goals.</u> "We are concerned that there is no defined end-state for terminal modernization, and past problems with developing and deploying the Standard Terminal Automation Replacement System (STARS) leave FAA in a difficult position to begin introducing NextGen capabilities. Future terminal modernization costs will be shaped by (1) NextGen requirements, (2) the extent of FAA's terminal facilities consolidation, and (3) the need to replace or sustain existing (legacy) systems that have not been modernized."[8]

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[4] https://www.oig.dot.gov/sites/default/files/05A3012A000.pdf

[5] https://www.oig.dot.gov/sites/default/files/cc2006065.pdf

[6] https://www.oig.dot.gov/sites/default/files/av2007031.pdf

[7] https://www.oig.dot.gov/sites/default/files/WEB_ATC_Mod_4-14-08_Final.pdf

[8] https://www.oig.dot.gov/sites/default/files/WEB_FILE_NextGen_Statement.pdf

FAA did not execute most of the industry's 2009 recommendations stemming from the RTCA[9] NextGen Mid-Term Implementation Task Force. (Commonly known as Task Force 5)

After several years of scrutiny, as outlined above, in 2009, a concerted effort was taken to create an approach to NextGen that would pave the way for a government-industry partnership to improve the nation's air transportation system in the near term. Specifically –

- September 2009 – RTCA NextGen Mid-Term Implementation Task Force Report. Executive Summary. "On January 16, 2009, the FAA sent a letter to RTCA requesting that a government-industry Task Force be established to forge community-wide consensus on the recommended NextGen operational improvements to be implemented during the transition between now and 2018. The Task Force was also asked to focus on maximizing NextGen benefits and facilitating the development of the business case for industry investment. The Task Force did not attempt to re-write the NextGen Implementation Plan and assumed that the baseline programs and technologies would continue to be developed by the FAA during the transition. The Task Force did look for opportunities to accelerate the transition where existing technologies could provide a "bridge" to NextGen programs that are still in development. Over 300 people from nearly every segment of the aviation community signed up to work toward a consensus set of recommendation on NextGen present in this report."[10]

While a third-party independent audit has not been done on the implementation of the Task Force 5 actions, we believe FAA has fallen short. For example the Task Force 5 report --

- Recommended a final investment decision on Segment 1 of Data Comm by 2011. That did not happen until 2014.
- Recommended achieving 3-and 5- miles separation standards through implementation of safety tools. The opposite has actually happened, assessments have resulted in lost capacity at several airports.
- Recommended a clear performance based navigation (PBN) strategy. In fact, a clear PBN strategy has yet to be finalized.
- Called for "complete airspace redesign projects in New York and Chicago in 2010-2012." Neither has taken place.

Overall, the vast majority of Task Force 5 recommendations – articulated more than seven years ago – were either not implemented, delayed significantly, or changed so much as to not be recognizable. Task Force 5 was again, an opportunity missed.

A Brief History of NextGen. (Continued)

- April 2010 – DOT IG Testimony on Challenges in Meeting FAA's Long-Term Goals for Next Generation Air Transportation System. "FAA continues to face significant challenges in achieving its NextGen long-term goals. Central to this effort is the successful implementation of ongoing modernization projects that will provide platforms for new NextGen capabilities for enhancing capacity. However, key multibillion-dollar programs have experienced problems, and FAA has yet to fully determine their NextGen-specific requirements. These platforms include the $2.1 billion En Route Automation Modernization (ERAM) program. Delays with this and other projects will have a cascading effect on NextGen plans now and well into the future. One critical step to avoid risks with NextGen's cost, schedule, and capabilities is addressing gaps in partner agencies' research and development efforts and long-term budgets and plans. We identified actions that

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[9] RTCA stands for Radio Technical Commission for Aeronautics. RTCA is a private not-for-profit corporation that develops technical guidance and acts as an advisory body to the FAA.

[10] https://www.faa.gov/nextgen/media/nextgen_progress_report.pdf

can be taken now to strengthen the multi-agency approach, better leverage Federal research projects, and prevent duplicative efforts."[11]

- June 2011 – <u>DOT IG Report on FAA's Approach to SWIM has led to Cost and Schedule Uncertainty and No Clear Path for Achieving NextGen Goals.</u> "FAA is still in the early stages of developing SWIM but has increased the costs for the program's first of three segments by more than $100 million and delayed its completion by at least 2 years. Undefined requirements among the seven programs that will serve as implementation platforms for SWIM are driving these cost increases and schedule delays. Five of the program offices have not finalized their own system requirements, much less their plans to implement SWIM capabilities."[12]

- April 2012 – <u>DOT IG Testimony on Status of Transformational Programs and Risks to Achieving NextGen Goals.</u> "Other risks exist to the effective implementation of the transformational programs. These include the lack of an integrated master schedule for all the transformational programs to better coordinate how program capabilities—many of which are interdependent—will be implemented. Without this key planning tool, it will remain difficult for FAA to fully prioritize which transformational program capabilities will provide users with the greatest benefits or make trade-offs between program requirements when necessary. FAA also has yet to address complex integration issues with its automation systems to enhance flight data processing and its telecommunications infrastructure."[13]

- July 2013 – <u>DOT IG Testimony on FAA's Progress and Challenges in Advancing the Next Generation Air Transportation System.</u> "FAA's difficulties in advancing NextGen and transforming the national airspace system (NAS) stem from a number of underlying causes, including the lack of an executable plan and unresolved critical design decisions. For example, FAA's initial plans for NextGen did not address implementation costs or how technologies would be developed or integrated. Also key to NextGen's success is integrating new PBN routes and procedures at key airports in order to maximize near-term benefits and gain user support. Yet, FAA's lengthy procedure development process has delayed the implementation of new routes, and unresolved obstacles, such as the lack of updated controller policies and procedures, make it uncertain when airspace users can expect widespread benefits. Advancing NextGen also depends on successfully deploying new automation systems that controllers use to manage air traffic. However, FAA continues to face technical, cost, and schedule risks with its efforts to modernize or replace automation systems at terminal facilities because the Agency has not identified and finalized all needed software and hardware requirements. Furthermore, despite recent progress with ERAM—a multibillion dollar program for processing flight data—considerable work remains to complete the effort in 2014 as currently planned."[14]

- November 2014 – <u>DOT IG Testimony on Status of FAA's Efforts to Operate and Modernize the National Airspace System.</u> "FAA has taken steps to implement the provisions of reform legislation, including introducing new employee compensation systems and establishing the Air Traffic Organization (ATO). However, the Agency has not taken full advantage of its personnel reform authorities, or implemented changes that could significantly enhance air traffic operations. In general, FAA is not using business-like practices to improve its operational efficiency and cost effectiveness. As a result, FAA has experienced significant increases in its costs without appreciable increases in controller productivity. FAA's acquisition reforms have similarly fallen short of their goals to improve the delivery of new technologies and capabilities, as well as cost, schedule, and performance outcomes in FAA's modernization projects and procurement of

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[11] https://www.oig.dot.gov/sites/default/files/WEB%20FILE_NextGen%20Testimony.pdf

[12] https://www.oig.dot.gov/sites/default/files/SWIM%20Final%5E06-15-11.pdf

[13] https://www.oig.dot.gov/sites/default/files/NextGen%20Transformational%20Programs%5E4-23-12.pdf

[14] https://www.oig.dot.gov/sites/default/files/FAA%20Progress%20and%20Challenges%20Advancing%20NextGen%5E7-16-13.pdf

services. Finally, FAA faces significant challenges as it modernizes and operates the Nation's air traffic control system, including ongoing investment priorities for advancing NextGen, numerous complexities related to safely integrating UAS into the national airspace system, and a lack of viable business continuity plans to mitigate potential security risks to the air traffic control system."[15]

NextGen is amorphous and undefined.

- May 2015 – As mentioned earlier, the NAS reported on NextGen and stated that the FAA was not delivering the system that was promised and that the agency should "reset expectations" for the program since the original vision for NextGen is not what is being implemented today. The NAS goes further to say that NextGen was designed to overhaul the U.S. air transportation system through procedural and technological improvements, including the use of newer technologies such as precision satellite navigation systems and a digital communications infrastructure, to increase capacity, reduce delays, and improve safety. Instead, NextGen today is a set of incremental changes that primarily emphasizes replacing aging equipment and systems.[16]

- November 2016 – DOT IG Report on Total Costs, Schedules, and Benefits of FAA's NextGen Transformational Programs Remain Uncertain. "Since our last report, FAA has not adjusted anticipated benefits for its transformational programs, and many benefits remain unquantified, broad, or uncertain for improving the flow of air traffic and reducing Agency operating costs. For example, FAA's Automatic Dependent Surveillance-Broadcast (ADS-B) program currently focuses on the ADS-B *Out* capability, which is mandated for airspace users to equip by January 1, 2020, but ADS-B *Out* will offer only limited benefits to users for the foreseeable future. FAA expects more widespread benefits through the next stage of the program, ADS-B *In,* but these benefits cannot be easily quantified. In fact, FAA has yet to determine exactly when most of the transformational programs will start delivering benefits, and some of the most significant benefits may be difficult to achieve. For example, similar to ADS-B, the majority of benefits for Data Communications (Data Comm) depend on airspace users purchasing and installing costly new equipment. Many users are reluctant to equip, in part due to FAA's cancellation of an earlier data communications effort, which leaves uncertainty as to when benefits might be achieved. In addition, while the six programs defined in the existing baseline segments will provide new technology or infrastructure to support NextGen, not all six programs will necessarily "transform" the way air traffic is managed as FAA originally envisioned. There is only limited transformation in the early segments and the amount of transformation later in the programs has yet to be determined. While Data Comm is expected to change the way pilots receive and execute clearances, other programs are upgrades or replacement programs of existing systems. For example, National Airspace System Voice Switch (NVS) will replace 11 different types of older voice switches used by controllers to communicate with pilots and other facilities with a single modern voice switch. FAA expects NVS benefits to primarily reduce operating and training costs, but the Agency has yet to quantify the cost reductions."[17]

- March 2017 – DOT IG Testimony on Top Management Challenges Facing the Department of Transportation. "Enhancing the Capacity, Efficiency, and Resiliency of the NAS FAA operates the safest aviation system in the world and continues to work with stakeholders to implement new technologies that are providing near-term benefits to airspace users, such as fuel savings and increased airspace capacity and efficiency. However, FAA faces ongoing challenges with its investments to deliver specific capabilities and programs required to implement the Next Generation Air Transportation System (NextGen), which aims to modernize and replace 1950s-era ground radar and equipment."

[15] https://www.oig.dot.gov/sites/default/files/Master%20Statement%2011-17-14_final_508.pdf

[16] http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=21721

[17] https://www.oig.dot.gov/sites/default/files/FAA's%20Transformational%20Programs%20Report_issued%20Nov%2010_508.pdf

"We also recently reported that FAA has not fully identified the total costs, capabilities, or completion schedules for any of the six NextGen transformational programs that are required to implement NextGen and introduce key capabilities. Cost estimates for these six programs now total over $5.7 billion (increasing from a $2.1 billion estimate in 2012), and their completion has been pushed beyond 2020. Many of these programs' benefits remain unquantified as to how they will improve the flow of air traffic or controller workforce productivity."[18]

Individual case histories reinforce the lack of NextGen progress.

As noted, in 2004 the IG reported[19] that FAA had identified six 'transformational' programs that were expected to provide a platform of capabilities necessary to support NextGen, as follows:

- ADS-B;
- Data Comm;
- NVS;
- System Wide Information Management (SWIM);
- Collaborative Air Traffic Management Technologies (CATM-T); and
- Common Support Services – Weather (CSS-Wx).[20]

Over time, FAA began to include previously ongoing (and in some instances decades-old) efforts like the further deployment of PBN, improvements in surface operations and Wake RECAT as part of its public-facing NextGen portfolio. In the FAA's FY2016 Budget submission the index of NextGen programs has grown to over 30 line items including items like alternative fuels for general aviation. The practice of including any project or program that may fall into the category of improving safety, efficiency and capacity into the definition of NextGen has made the term amorphous.

As the NAS report stated, to be successful, even as a modernization project, NextGen needs a system architecture that defines how the pieces of the system fit together and allows for modeling and reasoning about possible futures. Currently, we operate in a system where the goals for these programs have been broadly outlined as improving safety, efficiency and capacity, but there have been no specific targets set by which to measure success or benefits.

Below is some overview and perspective on both the original 'transformational' programs and subsequent additions to the ever-expanding NextGen portfolio.

ADS-B *Out*

ADS-B is generally defined as a program expected to make use of satellite-based Global Positioning System (GPS) technology and eventually supplant ground-based radar as FAA's primary surveillance source in determining and sharing precise aircraft location information to controllers for equipped aircraft to reduce separation and improve traffic flow. The airline industry embraces ADS-B's potential for improving safety and increasing efficiency and recognizes its importance as a transformational NextGen technology based on the benefits and efficiencies it was intended to gain. However, intent and real world application have been quite different.

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[18] http://docs.house.gov/meetings/AP/AP20/20170316/105687/HHRG-115-AP20-Wstate-ScovelC-20170316.pdf

[19] Department of Transportation, Office of the Inspector General, Audit Report Total Costs, Schedules, and Benefits of FAA's NextGen Transformational Programs Remain Uncertain. Report Number: AV-2017-009. November 10, 2016. https://www.oig.dot.gov/sites/default/files/FAA's%20Transformational%20Programs%20Report_issued%20Nov%2010_508.pdf

[20] CSS-Wx replaced NextGen Network Enabled Weather (NNEW), and work from this program was transitioned to the System Wide Information Management (SWIM) Common Support Services. Source: FAA's NextGen Implementation Plan

As outlined by the IG, FAA announced completion of the ADS-B ground system with an approved baseline cost for three segments of $2.7 billion for fiscal years 2014–2020. Airspace users are mandated[21] to purchase and install ADS-B *Out* avionics, the first stage of the program, by January 2020. The IG indicated that ADS-B is proving beneficial in airspace where radar is limited or nonexistent, like the Gulf of Mexico and Alaska. However, the program provides little benefit to airlines operating in congested airspace, and there is considerable uncertainty regarding whether airspace users will be able or willing to meet the 2020 mandate.[22]

As referenced above, airspace users are mandated to purchase and install ADS-B *Out* avionics. The FAA's 2008 Notice of Proposed Rulemaking (NPRM) to develop and deploy ADS-B *Out* was poorly conceived and subjects industry to enormous costs without demonstrating or articulating benefits. At the time A4A recommended, to no avail, that FAA develop financial incentives for users to equip with this capability. Further, FAA ignored additional A4A recommendations to vet the ADS-B concept, approve technical standards that are harmonized internationally, establish better-than-radar separation standards, and better coordinate technical aspects of ADS-B implementation via a supplemental NPRM.

Unfortunately, to date, FAA has not presented a plan that would include decommissioning ground-based radars or reducing separation standards, rendering ADS-B somewhat superfluous. The general aviation[23] community has also identified the high cost of equipage and lack of benefits as a barrier to meeting the 2020 equipage mandate.

In the meantime, since 2007, FAA has spent $1.5 billion to install the ADS-B ground stations, which are not being used in a meaningful way to actually manage or control air traffic. FAA touted the completion of the installation of these ground stations as a key improvement for NextGen.[24] This is indicative of the FAA's approach of claiming progress despite the lack of policies and procedures that result in actual benefits to the traveling public and users of the ATC system. Deploying technology and utilizing technology are two very different things – in this instance they are, unfortunately, mutually exclusive.

Despite this, the airline community is required to comply with the FAA mandate, achieving 100 percent ADS-B *Out* equipage by January 1, 2020 at an estimated cost of $1 billion to U.S. airlines without seeing any reduction in separation standards or other improvements that would otherwise provide benefit. While we acknowledge that separation standards cannot be addressed until all aircraft are equipped the situation underscores FAA's lack of planning or evaluation of the potential benefits as part of a larger integrated master schedule.

Of note, in comments on the ADS-B NPRM in 2008 A4A (then ATA) "recommended FAA coordinate with industry to establish technical standards that are compatible and consistent with Australian, Canadian and European standards…" FAA did not accept that recommendation and instead established accuracy and integrity performance requirements that exceed international requirements. Those performance requirements exceed the capabilities of the GPS receivers currently available for use in transport category airplanes. A4A had to subsequently petition for exemption to the ADS-B *Out* equipment performance requirements, and received this relief which allows for a five year exemption from these accuracy and integrity requirements.

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[21] In May 2010, FAA published the final rule mandating that most NAS users equip with ADS-B Out avionics by 2020, 14 CFR Part 91, Automatic Dependent Surveillance – Broadcast (ADS-B) Out Performance Requirements To Support Air Traffic Control (ATC) Service

[22] https://www.oig.dot.gov/sites/default/files/FAA's%20Transformational%20Programs%20Report_issued%20Nov%2010_508.pdf

[23] https://www.aopa.org/advocacy/advocacy-briefs/air-traffic-services-brief-automatic-dependent-surveillance-broadcast-ads-b

[24] https://www.faa.gov/news/press_releases/news_story.cfm?newsId=16135

Conversely, Canadian air navigation services provider NavCanada – government-regulated but independently run and accountable to a board of users – approached ADS-B very differently. NavCanada listened to its stakeholders and decided to implement ADS-B where no radar coverage already existed, such as the Hudson Bay. Instead of a one-size-fits all mandate, NavCanada used the incentive of more efficient routings to convince operators to equip with ADS-B avionics.

Using ADS-B, NavCanada has extended air traffic surveillance to cover 4 million square kilometers of airspace. NavCanada estimates that the expansion of surveillance coverage will save airlines an estimated $374 million in fuel costs by 2020 by enabling more fuel efficient routings, while reducing greenhouse gas emissions by about 982,000 metric tons.[25]

NavCanada is also part of a joint venture to expand air traffic surveillance to the entire planet by installing ADS-B receivers on a constellation of 66 Low Earth Orbit (LEO) satellites. NavCanada plans not only to be a partner in the joint venture but also has signed a contract to be the first customer when the service becomes available in 2018. Initially it intends to focus on incorporating ADS-B surveillance into the management of busy oceanic airspace over the North Atlantic where a clear user benefit case exists. Concurrently, FAA not only declined to participate in the joint venture but also has neglected to complete a business case for such oceanic services. Simply put, the U.S. is losing its leadership role in the world when it comes to air traffic services and advanced ATC technologies.

Data Communications (Data Comm)

The Data Comm program provides data communications services (i.e. text messages) between pilots and air traffic controllers. Data Comm provides a digital link between ground automation and flight deck avionics for safety-of-flight air traffic control clearances, instructions, traffic flow management, flight crew requests and reports.

According to FAA, Data Comm is needed to bridge the gap between current voice-only ATC and data-intensive NextGen. Data Comm will enable air traffic controller productivity improvements and will permit capacity growth without requisite cost growth associated with equipment, maintenance, and labor. Data Comm comprises automation enhancements for air traffic control message generation and exchange (hardware and software) and the communications data link between ground and airborne users. Current analog voice communications contribute to operational errors due to miscommunications, stolen clearances, and delayed messages due to frequency congestion. In FY 2004 and FY 2005, approximately 20 percent of En Route operational errors were voice communication related. Of those, 30 percent of the high severity operational errors were deemed to be communications related.[26]

According to the IG, FAA has approved funding of almost $2 billion for the first segment of Data Comm (which is broken into two phases—phase 1 for tower and initial en route services and phase 2 for full en route services). FAA's current work is focused on providing departure clearance services at 57 airport towers, which was originally planned for 2019. In response to the NextGen Advisory Committee (NAC)[27] investment priorities, FAA accelerated the schedule for tower services. [28]

Airlines support Data Comm and acknowledge progress has been made. The accelerated schedule for tower services did allow airlines to realize some benefit (in the form of time savings). However, FAA plans do not currently call for implementing data link communications in terminal airspace and FAA is only

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[25] http://www.navcanada.ca/en/products-and-services/pages/on-board-operational-initiatives-ads-b.aspx

[26] https://www.transportation.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FAA.pdf

[27] 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

[28] https://www.oig.dot.gov/sites/default/files/FAA's%20Transformational%20Programs%20Report_issued%20Nov%2010_508.pdf

beginning to develop the capability for controllers and pilots to exchange a limited set of digital messages at high altitudes (en route) in 2019.[29]

In contrast, in 2014, NavCanada had already introduced data link communications capabilities for all high altitude operations for suitably equipped aircraft.[30] Yet again, another example of the U.S. leadership being supplanted by a more nimble air service provider not shackled by the inherent constraints of government.

As highlighted by the NAS report, NextGen needs a system architecture that defines how the pieces of the system fit together and allows for modeling and reasoning about possible futures. Data Comm is a good example of the lack of a master, integrated NextGen plan.

Long-term technological deployment and corresponding equipage investment needs are not aligned in a way that provides quality user benefits in the near to midterm and the promises of what is to come in 2030 have little bearing and minimal benefit today. As the NAS release indicated, the current architecture focuses on documentation rather than supporting decision making and is not an adequate foundation for managing changes in technology and operations.[31]

PBN

Per the FAA website, PBN uses satellites and onboard equipment for navigation procedures that are more precise and accurate than standard avionics and ground-based navigation aids. PBN is so named because the types of routes and procedures an aircraft can fly are dependent upon the performance level of equipment and pilot training. PBN comprises Area Navigation (RNAV) and Required Navigation Performance (RNP). RNAV permits aircraft to fly any desired flight path within the coverage of ground- or space-based navigation aids, within the limits of aircraft avionics, or with a combination of these. RNP is a more advanced form of RNAV that includes an onboard performance monitoring and alerting capability.

Unfortunately, PBN has been somewhat haphazardly rolled out across the national airspace system. Initially, the program goals focused on the quantity versus quality of PBN procedures implemented. In many cases, those procedures were overlays of existing conventional procedures and provided little to no benefit. The program evolved to include multiple individual efforts involving PBN route or flight procedure implementation, as well as a program called Optimization of Airspace & Procedures in the Metroplex (OAPM), which focused on transitioning to a PBN environment in the airspace and at airports within a particular metropolitan area. OAPM was later renamed Metroplex. To date, Metroplex projects have been completed in North Texas, Houston, Northern California, Washington, DC and Charlotte. Several other Metroplex projects are in progress. As noted, the North Texas Metroplex project is the only one in which a benefits analysis has been completed, by the JAT, composed of representatives from FAA, MITRE, RTCA, A4A and airlines.[32] The analysis concluded that efficiency benefits were negligible at best. Those responsible for the analysis cited difficulties in separating specific NextGen variables from other factors that may affect efficiency. Also, a post-implementation analysis of fuel burn has not been completed.

Critically, as emphasized above in the discussion of Data Comm, successful implementation of PBN and other NextGen programs relies on addressing interdependencies. Per the FAA website[33], "The interconnectedness of NextGen programs is apparent with the Decision Support System called TBFM. This system supports PBN operations by efficiently spacing aircraft arriving at an airport. For instance, TBFM accurately calculates and generates arrival times for all aircraft flying over a specific metered

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[29] https://www.oig.dot.gov/sites/default/files/FAA's%20Transformational%20Programs%20Report_issued%20Nov%2010_508.pdf

[30] http://www.navcanada.ca/EN/media/Pages/news-releases-2014-nr10.aspx

[31] http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=21721

[32] https://www.faa.gov/nextgen/snapshots/priorities/
[33] https://www.faa.gov/nextgen/update/progress_and_plans/pbn/

position to an assigned runway. This enables uninterrupted Optimum Profile Descents (OPDs). Airports with frequently high traffic volumes, complicated arrival procedures, or both require the structured flow of TBFM to ensure efficient use of PBN." This point is reinforced further by FAA's NextGen business case[34] update issued in July 2016: "The cost to develop any specific NextGen improvement cannot be directly determined. Single budget line items fund a capability that typically achieves multiple improvements. Thus, separating costs associated with a particular improvement from other improvements sharing a common capability becomes difficult. The occasional need to coordinate development of separate improvements in order to ensure compatibility and overall system integration often results in aggregating funding sources, complicating cost identification even more. Furthermore, developing an improvement requires the assumption that all interdependent capabilities have achieved the required level of operability. For example, TBFM relies on functionality from ERAM and STARS."

Unfortunately, TBFM is not consistently used by air traffic control facilities across the national airspace system. As a result, the traffic flow management strategy for PBN implementation has broken down, resulting in decreased efficiency and a failure to realize the promised benefits – including those currently being cited by FAA as having been achieved to date. For example, of the $2.7 billion in benefits FAA says were realized over the five-year period 2010-2016, deployment of TBFM allegedly accounted for $1 billion, or 37 percent of the total.[35] That estimate is shockingly high given the experience of national airspace system users and the fact that the estimate assumes nominal (favorable) operating conditions. Accordingly, it is important that FAA pursue an integrated approach to NextGen to ensure that interdependent programs are implemented in time to enable realization of maximum benefits from the core technology.

Surface Operations

The NextGen activities directed at the airport surface consist of more efficient management of departure aircraft through optimal flow back and forth from gates to runways, optimal runway use, and efficient departure queue management to ensure an efficient transition from departure to the en route phase of flight. In addition, eventually, paper flight-progress strips used by control tower personnel will be replaced by electronic flight-progress strips. The U.S. is one of the few remaining major air navigation service providers that have not transitioned to electronic flight strips.

For example, NavCanada has been routinely using electronic flight strips since 1998 – almost 20 years ago. The automated distribution of data streamlines coordination among air traffic control positions, reduces heads-down time, and reduces controller workload. As cited by National Air Traffic Controller Association (NATCA), the failure to move away from paper results in unnecessary costs for FAA and users of the system and results in controllers spending time on low-value work rather than the high-value work needed by operators. The program baseline has fluctuated drastically in recent years. The best-case scenario does not project realization of benefits until approximately 2020.

Wake RECAT

Decades ago, experts in wake turbulence, safety and risk analysis determined that the required separation between certain aircraft can be safely decreased.[36] This determination followed a decade of extensive, collaborative research between the FAA, the DOT's Volpe National Transportation System Center, EUROCONTROL and the aviation industry. Safely reducing separation standards between aircraft increases capacity and efficiency, which in turn leads to fewer delays, saving time and fuel burn while reducing the size of aviation's carbon footprint. The FAA only decided to pursue Wake RECAT when David Grizzle, former FAA Chief Operating Officer, forced the issue within the Agency.

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[34] https://www.faa.gov/nextgen/media/BusinessCaseForNextGen-2016.pdf

[35] https://www.faa.gov/nextgen/media/BusinessCaseForNextGen-2016.pdf

[36] Prior to Wake RECAT, separation standards were set according to the weight of an aircraft. However, since the FAA first implemented weight-based categories, airline operations and the mix of aircraft types have changed dramatically, with the rise of regional jets at the light end and aircraft such as the Airbus A380 at the upper end.

While the industry strongly supports the Wake RECAT initiative and acknowledges benefits at certain hub airports, it is not a NextGen program as the FAA budget would now define it. Wake RECAT requires no equipage by FAA or aircraft operators, it is a procedural effort – a change in wake turbulence separation standards based on recategorization of several aircraft types – not a delivery of a capability or technology.

It was only recently that the FAA started labeling Wake RECAT as NextGen. One could question why that decision was made. We would argue that because benefits from Wake RECAT, estimated by FAA to be $1.86 billion from 2010-2030[37], bolsters the FAA's marketing campaign about its successful implementation of NextGen. This mis-categorization is a thinly veiled attempt to mask the slow progress on the truly transformational capabilities of communications, navigation and surveillance.

Air Traffic Controller Staffing

Below is an excerpt from an article[38] written by Trish Gilbert the Executive Vice President of NATCA [39] that underscores the mismanagement of the controller workforce and the need for immediate change in how we govern and finance our ATC system.

In June 2016, Ms. Gilbert wrote –

> "Unfortunately, budgetary missteps and bureaucratic red tape have led to a shortage of controllers. What has been a concern for many years has now reached a crisis level. The nation's ATC system has the fewest Certified Professional Controllers – 10,667 - in nearly three decades. Controller staffing has fallen nearly 10 percent since 2011, the FAA has missed its hiring goals for the last seven years, and there are currently more controllers eligible to retire today than are currently in the pipeline to replace them. Significant changes are needed immediately.
>
> The process to become an air traffic controller isn't an easy one. Controllers undergo rigorous and thorough training, beginning with two-to-five months at the FAA Academy in Oklahoma City. Upon graduation, trainees are assigned as developmental controllers at an air traffic control facility. They must complete several stages of additional training before full certification. The total process can take two-to-four years. Controllers must be hired by the FAA before their 31st birthday and retire by age 56.
>
> A steady flow of qualified candidates is needed to keep the system properly staffed. Following automatic spending cuts imposed through a process known as sequestration, the FAA instituted a hiring freeze and shuttered the FAA Academy between March and December 2013. Even hiring the maximum number of controllers that could be trained in 2015 and 2016 could not make up the gap created by the freeze. New hires still require between two and four years of training to become fully certified. Only CPCs can do the training. This training often takes these full-fledged controllers away from their primary job of guiding traffic. Facilities that are already at critically low staffing levels (defined as requiring overtime and six-day work weeks to fully staff all positions) are facing dire situations as controllers are expected to do more with less.
>
> As a result, the FAA can't adequately staff many facilities in the near term. If the staffing crisis remains unaddressed, the FAA will be hard-pressed to maintain current capacity – meaning the same number of flights each day – let alone expand and modernize the ATC system. The deployment of NextGen programs, procedures, and equipment to upgrade the ATC system will

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[37] https://www.faa.gov/nextgen/media/BusinessCaseForNextGen-2016.pdf

[38] http://www.thehill.com/blogs/congress-blog/technology/283328-air-traffic-control-staffing-shortage-must-be-addressed

[39] http://www.natca.org/

increase capacity and efficiency in our nation's airspace. Unfortunately, a lack of adequately trained controllers is preventing these upgrades from being implemented in a timely manner."

The controller staffing crisis is the result of a poorly operating governance and funding structure. ATC Reform is needed to address these issues.

New York/New Jersey/Philadelphia Airspace Redesign

According to the FAA website, the purpose of the New York/New Jersey/Philadelphia Metropolitan Area Airspace Project is to increase the efficiency and reliability of the airspace structure and ATC system and reduce delays while maintaining or increasing the safety of the national airspace system. FAA goes further to say that they have completed the first two stages of a New York-New-Jersey-Philadelphia Airspace Redesign which have brought tangible benefits to airlines operating in the New York and Philadelphia metropolitan areas. The FAA will begin an effort to further reduce delays in the airspace over New York through a collaborative initiative, based on the Metroplex approach.[40] That webpage was last modified on October 1, 2015.

Given the importance of New York/New Jersey/Philadelphia Metropolitan Area Airspace one would expect the FAA's Metroplex website to reflect progress on the project. However, that site[41] references twelve Metroplex projects including various stages of implementation ranging from evaluation, pre-design to complete, none of which are the New York/New Jersey/Philadelphia Metropolitan Area Airspace. As the current Chairman of the NAC, FedEx President & COO Dave Bronczek has asked that the FAA make New York / New Jersey a priority for modernization.

In September 2007, FAA issued a Record of Decision (ROD) regarding New York/New Jersey/Philadelphia Metropolitan Area Airspace and stated –

> "As the agency responsible for managing the National Airspace System (NAS), the FAA continuously seeks ways to control air traffic more efficiently. In 1998, the FAA Administrator chartered the National Airspace Redesign as the primary means of modernizing the nation's airspace. The National Airspace Redesign was to take advantage of opportunities arising from new technologies, new aircraft equipage, improved infrastructure, and procedural developments to enhance safety and efficiency. From the beginning, the importance of the New York/New Jersey Philadelphia area was recognized. This airspace formed the northeast corner of the "Eastern Triangle" where the first redesign efforts were focused."

We understand that the New York/New Jersey/Philadelphia airspace is complex and, to some extent, has been contentious. Nevertheless, its significance is obvious. Problems in the Northeast cascade throughout the national airspace system every day. Moreover, completion of this project has been described in the context of being fundamental to progress in the successful implementation of NextGen. It has now been nearly 20 years since the FAA started looking at the airspace (1998) and a decade since the FAA issued the ROD to include the project in their Metroplex work. Yet there is no evidence that it is even in the evaluation or pre-design phase.

After nearly two decades, it is clear that transformational ATC reform is the solution.

The challenges of modernizing our ATC system under the current governance and funding are well documented. Fortunately, the solutions are also well documented and have been tested time and again across the globe.

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[40] https://www.faa.gov/air_traffic/nas/nynjphl_redesign/

[41] https://www.faa.gov/nextgen/snapshots/metroplexes/summary/

It is clearly evident that the continued challenges faced by the FAA in implementing NextGen are not the result of any individual or management team. They are instead the result of a dysfunctional governance and funding system. Many countries have faced these same challenges and have taken transformative steps to improve not only the safety of their ATC systems but also make them more efficient and responsive to users of the system.

In a 2013 Hudson Institute Initiative on Future Innovation report entitled Organization and Innovation in Air Traffic Control author Robert W. Poole, Jr.[42] summarized the following:

> "Unfortunately, progress toward implementing advanced air traffic management (ATM) in the United States (where the system is called "NextGen") has been far slower than anticipated."

> "The FAA is slow to embrace promising innovations that originate in outside research organizations or private-sector companies. When the agency does embrace something new, it has a hard time defining its requirements and often delegates this task to contractors—who come up with many add-on functions that increase cost and make implementation more complex. And the FAA does a poor job of procuring new technology, with many programs eventually cancelled or emerging years late at inflated cost. The agency is particularly resistant to high-potential innovations that would disrupt its own institutional status quo—such as performance-based navigation, real-time weather, and remote towers."

The report identifies and examines five institutional factors that account for the FAA's status-quo bias that come from case studies and three decades of critical reports by the IG and the Government Accountability Office (GAO). The Hudson Institute study then comes to the same conclusion that our members have come to in that reform of the U.S. air traffic system's funding and governance—organizational reform—is the key to a full embrace of advanced NextGen in the United States.

Our ATC funding and governance system is broken beyond repair within the constraints of government. Funding for ATC is repeatedly subject to stops and starts from government-wide budget restrictions and shutdowns, compromising safety advancements, efficiency and modernization.

Congress and the Administration have the opportunity to restore America's role as a leader in ATC technology and innovation while helping passengers and air service providers who have been forced to accept inefficiencies and delays. Transforming our ATC system would be the single largest aviation public policy advancement since deregulation in 1978 and is a concept we would encourage your Committee to endorse.

Thank you,

Captain Billy Nolen
Senior Vice President, Safety, Security and Operations

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[42] https://hudson.org/content/researchattachments/attachment/1199/poole_hi_res.pdf