SUSTAINING THE NATIONAL AIRSPACE SYSTEM: A CALL FOR CONTINUOUS MODERNIZATION

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By Ryan Cooperman, J.D.
Director of Public Policy &
Government Relations, AIAA

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EXECUTIVE SUMMARY

Over the last two decades, the United States has made significant strides in modernizing our National Airspace System (NAS) through the Federal Aviation Administration's (FAA) Next Generation Air Transportation System, known as NextGen. This monumental effort has reaped tangible benefits: the FAA estimates that advancements between 2010 and 2025 have generated around $13.9 billion in advantages such as shorter travel times for passengers, reduced operating costs for aircraft, fuel savings, and increased safety. These outcomes matter because as we look forward to the next stage of modernization, it's crucial to build on our successes rather than starting from scratch. We need to recognize that the NAS is a critical component of our national infrastructure and it deserves our utmost attention. AIAA advocates for a continuous modernization strategy for the NAS, prioritizing it as a national infrastructure imperative – ensuring that the NAS continues to be safe and reliable, while being resilient and adaptable to future challenges.

THE CHALLENGE AHEAD

Today, the landscape has evolved. Our focus must shift toward maintaining the capabilities we've already established while addressing the pressing need to replace outdated systems, modernize telecommunications and facilities, enhance cybersecurity, and rebuild key parts of our air traffic control workforce. All of this must occur without compromising the safety and reliability of our daily operations.

The urgency of this challenge is underscored by the condition of portions of our existing infrastructure. A 2023 FAA assessment of 138 air traffic control systems found that 5 were unsustainable and another 54 were potentially unsustainable. Of those 105 systems, GAO identified 17 as especially concerning after considering their age, sustainability rating, operational impact, and expected modernization date. For several of those systems, associated modernization efforts were not expected to be completed for another decade or more. It's important to clarify that the NAS isn't failing. Rather, the FAA is grappling with the weight of operating and maintaining legacy systems while also being tasked with developing a future-ready infrastructure for aviation. Congress has recognized the importance of continued modernization. The FAA Reauthorization Act of 2024 mandated the creation of an Airspace Modernization Office to oversee research, systems engineering, and the ongoing evolution of the NAS.

We at AIAA wholeheartedly support this initiative, believing it should serve as the foundation for a sustainable approach to air traffic infrastructure.

AIAA'S POSITION: A PATH FORWARD

AIAA advocates for a continuous modernization strategy for the NAS, prioritizing it as a national infrastructure imperative. Below is a path on how we can move forward:

1. Congressional Leadership: Continuous modernization should be the guiding principle for future NAS investments. Building on the FAA Reauthorization Act of 2024, Congress should ensure the FAA's integrated future-state NAS plan connects modernization goals with operational risks, major investments, and workforce needs. Funding stability is essential for implementing credible modernization plans, while robust oversight should emphasize reducing operational risks across the NAS.

2. Risk-Based Lifecycle Management: The FAA should maintain a comprehensive, risk-based lifecycle plan to determine which systems should be sustained, modernized, consolidated, or retired. The analysis should account for dependencies and trade-offs, including the operational and financial consequences of delaying modernization. The status quo is not risk-free. Continued reliance on aging systems can increase exposure to outages, maintenance challenges,

diminishing technical expertise, cybersecurity vulnerabilities, and constraints on future capabilities. Those risks should be accessed and communicated alongside the cost and risk of modernization so that Congress and other decision-makers understand the consequences of both action and inaction.

3. Workforce Readiness: The readiness of our workforce is just as crucial as the infrastructure itself. Major modernization initiatives must identify who will operate and maintain new systems and ensure they receive proper training before we retire legacy systems. Technology can improve safety, efficiency, and productivity, but it does not eliminate the need for a highly skilled workforce. The skills required of that workforce will evolve as automation, software, digital systems, cybersecurity, and new operating concepts become more prominent in the NAS. FAA workforce planning should therefore address not only staffing levels, but also how training, technical competencies, career development, and workforce composition must change alongside the systems employees will operate and maintain.

4. Design for Integration: New capabilities should integrate effectively with existing systems during transition while being built on modernized architectures that support scalability, interoperability, and the integration of future systems and operating concepts. Both government and industry should focus on open interfaces and competitive practices to avoid vendor lock-in and ensure sustainability.

5. Align Local and National Investments: States play a vital role in aviation infrastructure through planning, investment, and workforce development. State aviation strategies should align with federal modernization plans to ensure a cohesive approach to infrastructure and workforce needs.

6. Research and Technology Transition: A strong research pipeline is essential for addressing the future of air traffic management. Collaboration among NASA, the FAA, and industry is crucial to ensure that technological advancements can transition smoothly into operational use.

LOOKING AHEAD

For nearly twenty years, NextGen has guided our air traffic management modernization efforts, leading to satellite-enabled aircraft tracking, digital communications, and sophisticated automation. While these capabilities have become integral to our daily operations, we must remain vigilant and proactive in our approach to sustaining and enhancing the NAS.

By 2025, services like Data Communications were operational at all 20 Air Route Traffic Control Centers, and System Wide Information Management was being implemented across the NAS. Our journey doesn't end here; rather, it is just the beginning. Together, we can ensure a safe, efficient, and innovative future for aviation in the United States.

The FAA estimates that NextGen capabilities implemented between 2010 and 2025 generated approximately $13.9 billion in measured benefits in 2025 dollars. Most of those quantified benefits come from reduced passenger travel time, followed by aircraft operating-cost and fuel savings, along with safety improvements. These measures, however, do not capture every benefit created by modernization. Investments such as ADS-B and SWIM have also expanded the availability and usefulness of real-time aviation data, supporting improved situational awareness, operational planning, and information services used by airlines, pilots, airports, service providers, and the traveling public. The value of modernization extends beyond the benefits that can be readily captured in traditional cost and delay calculations.

It's important to look deeper than simply categorizing NextGen as a success or failure. This was a massive, multi-decade effort that involved countless systems, procedures, investments, and operational shifts. While some parts exceeded expectations, others lagged. The requirements evolved, and technology shifted as the programs progressed. This journey teaches us a vital lesson that modernization is an ongoing process. Aircraft tehnology will continue to evolve. Software will advance. Cybersecurity threats will change. Commercial space activity, uncrewed aircraft, advanced air mobility, and increasingly automated systems will place new demands on the NAS. At the same time, some of these

technologies could expand aviation access to communities and regions that are currently underserved or not served by existing air transportation. The systems being installed today will eventually become legacy systems themselves, so the architecture we build now must be capable of adapting to uses we cannot fully anticipate today.

Our challenge is to break the cycle where modernization needs build up until the government finds itself facing the urgent need to replace significant portions of critical infrastructure all at once. Continuous modernization is our best defense against that scenario.

THE LEGACY-SYSTEM CHALLENGE

The strongest case for ongoing modernization isn't just about chasing the latest technology. It's about making informed lifecycle decisions. The FAA's 2023 sustainability assessment highlights this issue. Out of 138 air traffic control systems evaluated, a concerning 51 were deemed unsustainable, and 54 were flagged as potentially unsustainable. The Government Accountability Office (GAO) noted that these challenges can stem from outdated features, lack of spare parts, unmaintainable components, and other maintenance hurdles.

It's crucial to understand the difference here. An unsustainable system doesn't automatically mean it's unsafe or on the brink of failure. An older system can still do its job, but it may become harder or more costly to maintain over time.

This distinction calls for proactive planning rather than delay. The GAO identified 17 systems that raised significant red flags based on various factors, including sustainability, operational impact, age, and expected timelines for modernization. As of May 2024, some of these systems are projected to take six years or more to modernize, with several facing completion timelines stretching 10 to 13 years into the future. Alarmingly, four of those 17 systems had no associated modernization plans at that point, which presents the real-life challenge of managing lifecycles.

Delaying action can force the FAA to rely on equipment that's becoming harder to support, all while pushing urgent replacements to the forefront. On the other hand, replacing systems too soon can waste useful assets and divert resources from addressing more pressing operational risks. Neither path is wise which is why the ideal approach is to prioritize based on risk.

Systems that continue to perform reliably should not be replaced solely because of their age. But current performance cannot be the only consideration. A system may still meet today's operational requirements while its architecture, interfaces, computing environment, or supportability limits the introduction of future capabilities. Lifecycle risk assessments should therefore consider not only the probability of failure, but also whether retaining a system constrains broader modernization or the integration of emerging operations.

The Traffic Flow Management System illustrates the issue. TFMS has supported traffic-flow planning and management for years and has been continually enhanced, but the FAA now describes it as being at the end of its lifecycle and plans to replace it with Flow Management Data and Services using a modern architecture. The lesson is not that a functioning system should be discarded prematurely. It is that technical obsolescence can eventually become a constraint on future capability even before operational performance becomes unacceptable.

BNATCS IS AN IMPORTANT STEP BUT IT IS NOT THE END STATE

The FAA and the Department of Transportation are taking significant steps to tackle the challenges facing our air traffic infrastructure with the introduction of the Brand New Air Traffic Control System (BNATCS). This initiative aims to revamp and modernize outdated communication, surveillance, automation, and facility systems throughout our NAS. The FAA believes that BNATCS will lead to more dependable operations and help cut down on delays caused by equipment issues. Right now, we're seeing important projects like radar upgrades and the development of a Common Automation Platform come to life.

AIAA wholeheartedly supports this investment, but it is vital to see BNATCS as just one piece of a broader modernization puzzle, not the destination. The systems we're putting in place today will eventually need their own updates and replacements, so our larger goal should be to create a framework and management strategy that makes future upgrades smoother and less disruptive. This

involves keeping interfaces clear, planning for ongoing maintenance, aligning workforce and facility needs, and ensuring we leave room to integrate new technologies as they emerge. By doing this, we can build a more resilient and forward-looking air traffic control system for everyone.

BUILDING ON THE FAA REAUTHORIZATION ACT OF 2024

Congress has laid a strong foundation for the next phase of modernization through the FAA Reauthorization Act of 2024, which mandated the establishment of an Airspace Modernization Office. This office will oversee systems engineering, enterprise architecture, portfolio management, research and development, interoperability, and digitization, and will develop a cohesive plan for the future of the NAS. The law emphasizes "continuous modernization," and AIAA's position is that this should be the cornerstone for policymakers moving forward.

The integrated plan required by Congress shouldn't just be another strategic document sitting alongside the FAA's capital plan, acquisition portfolio, workforce planning, and research agenda. It should weave them together because a robust plan should pinpoint the capabilities the future NAS will require, highlight existing systems that pose the greatest risk, outline modernization dependencies, and detail workforce and facility needs, along with major transition points and the impact of any changes in schedule or funding.

Congress should be able to follow these connections without having to piece together the modernization strategy from numerous separate documents.

The FAA's existing Capital Investment Plan already gives a five-year outlook on NAS modernization programs and enterprise architecture roadmaps. The new integrated plan presents an opportunity to take it a step further by linking these investments to operational risks and a long-term vision for the NAS. This connection will enhance Congress's oversight and also provide the FAA with a more stable framework for executing modernization.

UNDERSTANDING MODERNIZATION AS A SYSTEM-OF-SYSTEMS CHALLENGE

Modernizing air traffic control isn't just about swapping out old equipment for new. Each component – a radar system, a communications platform, or a controller display – it all depends on a web of other systems, facilities, power sources, telecommunications, software, cybersecurity measures, operating procedures, trained personnel, and maintenance support. Changing one piece can create new requirements elsewhere before we see any operational benefits.

For example, take Data Communications, which is a technology that allows certain information and aircraft clearances to be shared digitally between controllers and pilots instead of relying solely on voice communication. According to the FAA, this capability helps minimize miscommunication while making exchanges more efficient.

But for Data Communications to be effective, everything else in the network must work seamlessly. Aircraft need to be equipped for it, ground systems must communicate reliably, and software and automation must process the information correctly. There must be established procedures, trained personnel, and robust cybersecurity measures in place. Moreover, legacy and modern digital procedures may need to coexist during the transition.

This illustrates why the performance of a program, and the performance of the entire system can differ. A project may meet its cost and timeline targets yet still fall short of delivering expected value if the surrounding systems aren't ready to support it. Conversely, a single program might face delays while still yielding a long-term operational capability of significant value.

The FAA has considerable experience measuring modernization at the program level. NextGen reporting tracked implementation milestones, costs, schedules, and estimated benefits across a large portfolio of capabilities. Those measures remain necessary, but the next modernization framework should go further by improving visibility into how individual investments affect the performance and evolution of the NAS.

This requires examining dependencies before programs are approved and continuing that analysis through deployment. Digital engineering, model-based systems

engineering, simulation, and other systems-engineering tools can help identify how a proposed change affects connected systems, facilities, procedures, workforce requirements, cybersecurity, and future architecture. FAA research is already examining the use of digital engineering and model-based systems engineering to reduce requirements errors and improve assurance in digital systems.

Measures of success should also extend beyond whether technology was installed. FAA and Congress should understand whether the capability is being used as intended, whether operational procedures have adapted to take advantage of it, whether expected benefits are appearing, and whether implementation elsewhere in the NAS is limiting those benefits. In some cases, realizing the value of a new capability may require changes in training, procedures, incentives, or operating practices rather than another technology investment.

The FAA is already applying some of these lessons in the current modernization effort. Under BNATCS, the DOT and FAA adopted a Prime Integrator model intended to strengthen integration across major infrastructure efforts and establish clearer accountability for schedule and performance. This approach should be evaluated as implementation proceeds. Where it improves integration, transparency, accountability, and predictability, those lessons should inform future modernization efforts rather than remain unique to the current program.

However, these numbers by themselves don't capture the real impact of technology modernization and integration on the safety and performance of the NAS. What truly matters is how these investments change operations for the better. Did they phase out an outdated system that was hard to manage? Did they ease maintenance burdens or help the system bounce back more quickly after disruptions? Are traffic flows now more predictable, or has unnecessary workload been minimized? And importantly, do these changes pave the way for future innovations?

Ultimately, the success of modernization efforts hinges on their tangible benefits. A program can check all the right boxes in terms of acquisition milestones, but if it doesn't bring real operational improvements, it falls short. If a transition is challenging but leads to significant gains in reliability, resilience, or long-term maintenance of the NAS, then it's worth the effort.

STRIKING A BALANCE BETWEEN CONTINUITY AND ACCOUNTABILITY IN CONGRESS

Congress shouldn't be the one designing the NAS. Instead, its role should be to create an environment where good engineering, operations, and management can flourish. Developing and deploying major air traffic capabilities is no small feat. It can take years to design, acquire, test, certify, and finally bring new systems into operational use. Sometimes facility upgrades need to happen even before new technologies can be installed. And let's not forget, new equipment often must work alongside older systems during the transition period, which means controllers and technicians must go through proper training.

However, uncertainty complicates all of this. That's why Congress should ensure there's a reasonable level of continuity for approved modernization projects, while keeping an eye on performance. This isn't about giving a free pass. Predictable funding can facilitate accountability. When agencies know they have a stable financial path, it allows policymakers to more fairly evaluate if schedules are realistic, if risks are being well-managed, and if operational improvements are materializing.

It's also crucial for Congress to recognize the difference between replacing physical infrastructure and maintaining digital systems. While a radar system or facility might serve us for decades, software and cybersecurity are much more dynamic and require ongoing updates. Treating regular software updates and security enhancements like infrequent infrastructure replacements won't create the modern digital NAS we need. The FAA must have the flexibility to continually support its digital capabilities, while Congress ensures that safety, cybersecurity, competition, and taxpayer interests are protected.

Lastly, modernization, facilities, and workforce planning need to be viewed as interconnected. A shiny new system isn't much use without trained personnel ready to operate or maintain it. Conversely, a well-staffed facility running on outdated equipment isn't resilient. Both aspects are different sides of the same infrastructure puzzle.

BRINGING DISCIPLINED SPEED TO THE FAA

For the FAA, their real challenge lies in execution of modernization efforts. The development and transition of technologies and systems will always come with

challenges, and schedule delays are associated with real costs and risks, as highlighted by the GAO's findings.

However, aviation doesn't lend itself well to a trial-and-error approach during modernization. What we need is disciplined speed. It's essential to move quickly, but we can't skip crucial steps like systems engineering, testing, training, and cybersecurity analysis. These components are vital for safely integrating new technology into an existing system.

The FAA should maintain a comprehensive roadmap that links technology/system conditions, replacement schedules, facility readiness, telecommunications, software support, cybersecurity, workforce training, and operational transitions. Clear criteria should also exist for deciding when a system should be sustained, modernized, consolidated, or retired.

While age plays a role, it shouldn't be the only factor in those decisions. Other considerations like operational impact, reliability, supportability, cybersecurity risk, maintenance costs, and the knowledge readiness of the workforce are equally important.

The agency also needs to be honest about unrealistic timelines, as well as the funding required to meet timelines, and the impact when that funding is not appropriated. There's always pressure to promise quick results on federal initiatives, and while that's understandable, it's crucial to remember that engineering realities must prevail. A realistic schedule that recognizes dependencies and risks is far more valuable than an overly ambitious one that consistently slips.

WORKFORCE IS THE HEART OF INFRASTRUCTURE

It's common to see the air traffic controller workforce treated as a separate issue, but operationally, it's deeply intertwined with everything else. The FAA's 2026 workforce plan aims for a full staffing level of 12,563 Certified Professional Controllers. As of April 2026, they reported about 11,000 CPCs across more than 300 facilities, plus roughly 4,000 controllers in training, including around 1,000 who are retraining at new facilities. The reality is that getting a newly hired controller certified can take over two years, depending on the complexity of the facility.

These numbers highlight why simply announcing hiring initiatives isn't enough to gauge progress. Training, certification, facility placement, and attrition are all crucial factors. While modernization can enhance efficiency, it shouldn't be seen as a blanket solution to replace personnel. Well-thought-out automation can ease repetitive tasks and boost situational awareness, but poorly designed systems can lead to confusion and increased workload.

This is why we must integrate human factors considerations right from the start of modernization initiatives. Engineers, technicians, software developers, cybersecurity experts, safety personnel, and acquisition professionals are the backbone of the systems that controllers rely on.

During significant transitions, the FAA must ensure there's enough expertise to support older systems while simultaneously building knowledge of the new ones. Before retiring any legacy capability, every major modernization effort should ask itself: Who will operate the new system? Who will maintain it? Will those individuals be fully trained and prepared when the transition occurs? These questions are just as critical as the installation timeline.

CREATING A COLLABORATIVE APPROACH OF THE FUTURE FOR THE NAS

Modernizing the NAS is essential, but it is not just about introducing new technology. The real game changer lies in demonstrating an increase in performance and safety while minimizing risks associated with integration and transition. A prototype can shine in a controlled setting, but when it comes to the NAS, we need solutions that work consistently, regardless of the facility, weather, traffic levels, or operational scenarios. Reliability and availability are non-negotiable, and supportability is key.

To create effective solutions for the NAS, it's vital for companies to bring together a diverse team of stakeholders of operators, maintainers, human-factors specialists, cybersecurity experts, and safety professionals from the very start of the design process. Prioritizing interoperability and safe and effective use by the operators are essential.

The procurement of proprietary technologies and tightly integrated architectures can create vendor lock-in, reducing competition and making future upgrades, integration, and system replacement more difficult and costly. Modernized architectures should allow individual components to be upgraded or replaced where practical without requiring wholesale changes to everything connected to them. That modularity must be accompanied by safety, security, and assurance requirements appropriate to the function and mission criticality of each component. Applying the same requirements indiscriminately across every element of the architecture can add cost and complexity without necessarily improving safety. The objective should be an architecture that is modular enough to evolve while maintaining rigorous assurance where the consequences of failure demand it.

The FAA plays a crucial role in shaping the future of aviation. When the agency shares its vision by laying out its architectural goals, performance requirements, interfaces, transition strategies, and certification standards early on, it empowers the industry to make smarter research and investment choices. It's essential for the FAA to tap into the wealth of expertise available from organizations like NASA, federally funded research centers, universities, national labs, and nonprofit research groups. These partners can help test our assumptions, explore various options, tackle big-picture challenges, and refine technologies before any acquisition or deployment decisions are made. This isn't about promoting a particular vendor or tech solution. It's about clearly defining the operational issues we face and leveraging the entire U.S. research and engineering community to find effective solutions together.

STATE AND LOCAL CONTRIBUTIONS MATTER

States may not directly manage federal airspace, but their decisions significantly impact the infrastructure that supports our national aviation system. Programs like the FAA's Airport Improvement Program provide crucial federal funding for eligible public-use airports, enabling states to take on important planning responsibilities.

As states develop their aviation plans, it's essential to consider ongoing federal modernization efforts and how they influence airport development, communication systems, navigation, and workforce needs. This isn't about federal oversight, rather it is about fostering collaboration. Every infrastructure project, whether it's a runway, a drone corridor, or a futuristic air-mobility facility, operates within a larger system. Understanding that system is crucial before committing valuable resources.

States also have a unique opportunity to cultivate a skilled workforce. By collaborating with community colleges, universities, technical schools, and aerospace companies, they can create pipelines for technicians, engineers, and pilots, focused on real employment needs rather than generic projections. For those interested in AAM or uncrewed aviation, the same principles also apply. The success of a vertiport or test site hinges on the safe integration and acceptance of operations by surrounding communities.

RESEARCH PAVES THE WAY FOR OPERATIONS

The next generation of air traffic capabilities won't just spring from an FAA procurement process; it will be built on years of dedicated research. NASA's Air Traffic Management–eXploration project concluded in February 2026 after research focused on transforming air traffic management to accommodate new vehicles and operations. NASA's Air Traffic Management and Safety project continues work on automation, operational concepts, safety management, resilience, and integration of new air vehicles in close collaboration with the FAA.

This collaboration matters because the next generation of air traffic management will depend on how well new technologies fit into real operations. Automation must support human decision-making rather than complicate it. New aircraft and operating concepts must be introduced without degrading the capacity and safety of existing users. Information must move reliably among operators, service providers, and the FAA, including during communications or cyber disruptions. Those issues should be worked through in research and testing before deployment timelines begin driving the decisions.

Research should start with a clear operational issue and include those who will ultimately engage with the new capabilities – operators, maintainers, and users. Transitioning technology needs to be a focus from the beginning. Not every research endeavor should lead to deployment; failure is part of the process. However,

successful initiatives must have a solid pathway to further testing, standards, certification, acquisition, and real-world operations once they prove their value.

The relationship between research and operations is crucial, especially as the FAA rolls out its BNATCS. This innovative system aims to modernize various areas like communications, surveillance, automation, and facilities in the near term. Meanwhile, researchers are exploring new capabilities and operating concepts that will go beyond just replacing what we have now. It's essential for these two efforts to stay connected. The investments we make today should pave the way for a flexible architecture that can easily integrate future technologies, rather than building another system that will be hard to adapt or replace down the line. We must work together to create a future-proof air traffic system that meets the evolving needs of aviation.

NAVIGATING TRADE-OFFS WISELY

No approach to modernization is without its trade-offs. A complete overhaul can eliminate legacy-system issues quickly, but it also brings concentrated costs and transition risks. Incremental changes may ease immediate risks, yet they could lead to a longer coexistence of old and new systems, complicating operations.

Commercial technologies can accelerate innovation cycles but must still meet essential aviation standards for safety and reliability. Consolidating facilities or systems might enhance efficiency, but it can also create new resilience challenges if not managed carefully.

We should not and cannot settle for a one-size-fits-all ideology. The FAA must have the flexibility to employ various acquisition and transition strategies tailored to each capability while adhering to a cohesive enterprise architecture and clear operational goals.

At the end of the day, the guiding principle is simple: does the chosen approach enhance the safety, resilience, maintainability, capacity, and adaptability of the NAS while keeping lifecycle costs and transition risks in check? That's the question policymakers should prioritize as we shape the future of aviation together.

ASSESSING THE EFFECTIVENESS OF MODERNIZATION EFFORTS

A sustained modernization effort also requires a consistent way to measure whether the NAS is improving. Congress and the FAA should track a limited set of system-level outcomes, including the number and operational significance of unsustainable systems, the existence of credible sustainment or replacement plans for critical capabilities, system availability and recovery performance, workforce readiness, retirement of legacy systems after replacements become operational, and the ability of the NAS to accommodate new users/vehicles without degrading existing operations.

The point of all this is not to create another reporting exercise but rather, it is to give policymakers and operators a common view of whether modernization is reducing operational risk, maintaining or improving safety, and improving the long-term resilience of the system.

The measures used to track modernization should be tied to operational performance and supported by defensible technical baselines. Congress and the FAA should avoid creating targets that reward activity without demonstrating improvement. Schedule and budget performance remain important, but they do not by themselves show whether the NAS is becoming more reliable, resilient, and easier to sustain – all while not degrading the level of safety that is expected. The central measure of progress should be whether modernization is reducing operational risk across the system over time.

The FAA should have access to the same data to guide its investment decisions, while the industry needs transparency to navigate upcoming changes in architecture and requirements. Local states and airports should also understand how federal modernization initiatives align with their own infrastructure plans.

IN CONCLUSION

The United States has invested significantly in our NAS, and the benefits to-date are tangible. However, as we continue to modernize our systems for the future, a solid framework is needed for effective and efficient management. Past initiatives like NextGen have shown us that ongoing investment in communications, navigation, surveillance, and other key areas can lead to tangible

improvements. Yet, they also highlighted how challenging it can be to overhaul a complex system while keeping it fully operational.

The next stage won't be any easier. The FAA faces the daunting task of replacing aging infrastructure while maintaining current operations. It must find ways to recruit and train new controllers and technical staff while rolling out new technologies. We need to bolster cybersecurity even as we rely more on digital connectivity and ensure that new entrants can join the system without compromising the safety and efficiency that existing users rely on.

There's no single program that will address all these challenges. Congress must provide continuity and demand accountability. The FAA should manage the NAS through an integrated, lifecycle approach. The industry should prioritize interoperability, integration, and sustainability. Local states and airports must align their infrastructure and workforce investments with the broader national aviation strategy. Meanwhile, NASA and the research community should keep the pipeline of future capabilities flowing, always connecting it to real operational needs.

This isn't a call for unrestricted spending; it's a call to recognize the NAS as a critical component of our national infrastructure that deserves our utmost attention. Every generation inherits an aviation system shaped by past decisions. Today's leaders might not know exactly what aircraft will be flying in 2050 or what technologies will manage them, but their duty is to ensure that the NAS is resilient and adaptable to future challenges.

Modernization should no longer be viewed as a finite project with an end date. Instead, it should be seen as an ongoing national capability that we continuously nurture and improve.

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