

THE FUTURE NATIONAL AIRSPACE SYSTEM

The Federal Aviation Administration's 2035 vision for air traffic management services

Pamela Whitley, acting assistant administrator for NextGen, Federal Aviation Administration and Gregg Leone, vice president, aerospace and transportation, The MITRE Corporation



Change creates ever-evolving challenges for ATM. At the same time, an information revolution is occurring across the globe, offering opportunities for meeting those challenges. The FAA has a vision for seizing those opportunities to leverage the NextGen infrastructure and transform ATM into an information-rich environment over the next 15 years.

Driving the need for rapid change in ATM is the demand to accommodate new airborne vehicles, missions, and operations, including: low-altitude unmanned aircraft systems (UAS), private spacecraft launches, large unmanned cargo aircraft, urban air mobility aircraft, and high-altitude long-endurance sensing and telecommunications platforms.

Additionally, these new operations generate more data than ever before and are supported by an infrastructure that enables broader data distribution and information sharing. The widely divergent characteristics of these operations challenge the current regulatory structure and operational procedures considerably.

Many of these new vehicles and modes of operation have already begun to join the aviation world, and they are expected to grow to unprecedented numbers. Enabling this growth requires reaching beyond

traditional ATM to adopt inventive new concepts by applying modern, innovative technologies from other industries—particularly those that promote information sharing and data collection and analysis.

Recent decades have produced a phenomenal increase in information connectivity, available data, and delivery of actionable information to decision makers. With corresponding increases in computation power and storage, new technologies have emerged that can learn from these massive data stores. In some cases, that means making assessments or predictions in real- or near-real time.

FAA believes that embracing this information revolution within ATM provides opportunities for performance enhancement in aviation, as it has for many other businesses. This revolution is also key to integration; aircraft, rockets, and UAS will have to coexist in the future. That notion is at the core of FAA's strategy for achieving major changes in how ATM is performed between now and 2035.

A fully shared information environment

FAA envisions a fully shared information environment as the means to overcome the complex challenges new vehicle operations introduce. At the highest level, full

connectivity and smart / learning systems would enable the 2035 National Airspace System (NAS) to function. This full connectivity would be based on a public / private infrastructure incorporating advances in cellular technology and the Internet of Things. These capabilities would provide ubiquitous system-to-system communication and enable improved situational awareness of vehicles, subsystems, and ATM stakeholders. A common operational “now-cast” of the NAS would emerge through the sharing of weather, flight, flow, aeronautical, and surveillance information. Autonomous systems would rely on this situational awareness to safely operate in the airspace.

Data from each operation would be collected, shared and stored for numerous purposes. Systems could use this data to construct actionable recommendations as required. The collected data would also be used to analyze and monitor actual system performance, to tailor operational solutions, and reduce operational risks. The systems themselves would consume data to continually improve decision support through machine learning.

The public / private infrastructure that would create this information connectivity will provide an evolving capability to respond to expanding user needs. Where it

THE NAS WILL EVOLVE TO ADDRESS CHANGES IN THREE FUNDAMENTAL AREAS



is necessary, these partnerships will be established in order to introduce private sector technology and innovation while providing better enterprise capabilities such as communications, aeronautical information, and weather services. The use of shared infrastructure and services will allow both to evolve on pace with technology and the needs of the most demanding users or providers.

Continuous stakeholder collaboration

Operations in the 2035 NAS would be characterized by collaboration among the diverse traffic management services responsible for enabling the increased variety and number of new vehicles, missions, and operations. For instance, new traffic management services will be needed to address the operation of select new

entrants—such as UAS—within dynamically segregated airspace. This collaboration would be made possible through the fully integrated information regime.

While the future NAS accommodates diverse new entrants, it simultaneously improves performance to conventional operations by distributing decisions and allowing stakeholders to best manage their operations. The simultaneous co-existence and interoperability of diverse collaborating traffic management services with conventional air traffic services is expected to cost-effectively enable these and other future operations.

Safety assurance

This will be accomplished through tailored operations and flight rules that achieve acceptable levels of safety based on

operational characteristics. With the ubiquitous information afforded by the public / private communication infrastructure, the NAS will be able to assure safety through continuous monitoring, modelling, and verification to detect anomalies and correct for real-time risk.

Post-operation modelling can reconstruct hazardous conditions or anomalies and support causal analysis. This type of continuous auditing and monitoring will inform corrective actions across the system of systems and assure their efficacy.

A community effort

FAA cannot achieve this vision alone. The role of the vision and its principles is to guide the emerging architecture, detect incompatibilities, and bring them to stakeholder attention for resolution. Stakeholders must then work together to ensure concepts are compatible, access rules are negotiated, available infrastructure is leveraged, and information standards are developed—all in a timely manner.

Working together, all stakeholders can evolve to the vision and usher in a future era of growth in aviation and aerospace. ❖

TOMORROW'S AEROSPACE SYSTEM REQUIRES INTEGRATED OPERATIONS ACROSS THE GLOBE



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