



Testimony of  
  
National Air Traffic Controllers Association

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“Moving NextGen Forward: Leveraging the Assets of the FAA's [Federal Aviation Administration] William J. Hughes Technical Center.”



## **Introduction**

The National Air Traffic Controllers Association (NATCA) is the exclusive representative of over 14,200 air traffic controllers serving the Federal Aviation Administration (FAA), the Department of Defense (DOD) and the private sector. In addition, NATCA represents FAA's Alaska flight service specialists, FAA engineers, traffic management coordinators, aircraft certification professionals, agency operational support staff, regional personnel from FAA's logistics, budget, finance and computer specialist divisions, as well as agency occupational health specialists, nurses and medical program specialists.

Air traffic controllers are dedicated to ensuring that our National Airspace System (NAS) is the safest and most efficient in the world. In order to maintain that safety and efficiency, our controllers work to improve safety procedures, modernize the NAS and promote new technology. We have professional controllers involved in nearly every modernization and NextGen-related program the FAA is currently working on. Controller skills are put to work every day as they handle an impressive volume of flights – air traffic controllers separate more than 70,000 flights each day, safely moving nearly two million passengers through our skies daily. Air traffic controllers handle these flights in the busiest and most complex airspace in the world with roughly 5,000 planes in the sky at any given moment.

## **Next Generation Air Traffic Control System (NextGen)**

The Next Generation Air Transportation System (NextGen) is the FAA's effort to modernize the nation's air traffic control system. NATCA fully supports NextGen modernization, which will allow the FAA to meet increased demand while improving the safety of the NAS, reducing delays, and protecting the environment. According to the FAA's vision, NextGen will enable more aircraft to safely fly closer together on more direct routes, reducing delays, carbon emissions, fuel consumption and noise.

NextGen will transform the national air transportation system using new and existing technologies including satellite navigation and control of aircraft, advanced digital communications, and enhanced connectivity between all components of the NAS.

NATCA is proud to be involved in all aspects of the process as an essential stakeholder. NATCA and the FAA both recognize that stakeholder involvement is the key to continued success to NextGen. In addition to being present on NextGen projects, NATCA is represented as a member of the Radio Technical Commission for Aeronautics (RTCA), the FAA Management Advisory Council (MAC), and the NextGen Advisory Committee. Our presence, as well as that of industry leaders, has been an important addition to the discussion on modernization.

## **The William J. Hughes Technical Center**

Since 1958, the William J. Hughes Technical Center has served as the core facility for modernizing the air traffic management system, and for advancing programs to enhance aviation safety, efficiency, and capacity. Approximately 1,500 FAA employees work at the Technical Center, with another 1,500 contractor employees and 1,000 non-FAA tenants based on site.

The Technical Center's areas of focus include air traffic management, communications, navigation, surveillance, aeronautical information, weather, human factors, and airports and aircraft safety. The Technical Center also provides 24-hour, daily operational support to FAA field facilities all over the country. Technical Center specialists diagnose and correct problems so that critical systems remain operational. In addition, the Technical Center provides strategic direction to the corporate research, engineering, and development portfolio and ensures that it is integrated, well planned, budgeted and executed.

Some unique Technical Center laboratories include: air traffic management and simulation facilities, a human factors laboratory, the NextGen Integration and Evaluation Capability, a Cockpit Simulation Facility, a fleet of specially-instrumented in-flight testing aircraft, the world's largest full-scale aviation fire test facility, a chemistry laboratory for analyzing the toxicity of materials involved in a fire, surveillance test laboratories, a full-scale aircraft structural test evaluation and research facility, and the National Airport Pavement Test Facility. In addition, the Technical Center manages the FAA off-site test bed located at the Embry-Riddle Daytona Beach campus.

#### **Why is the Technical Center important for NextGen?**

NATCA is a strong supporter of the Technical Center, and we look at it as a facility to research, develop, and test new systems related to NextGen modernization. The WJHTC is the only place in the country where current NAS systems can be tested alongside new technologies. To facilitate that testing, the WJHTC has technologies and equipment, expert maintainers, engineers and scientists intimately familiar with the structure and operation of those technologies and equipment. The WJHTC also offers a unique advantage for private companies who work with the federal government to develop these new technologies – thanks to the guarantees and protections provided by the government, individual vendors and their staff are able to interact with each other and government employees while protecting their intellectual and technological property rights. The umbrella effect of these policies enables individual experts from various domains to identify and solve complex problems with sometime obscure system integration issues quickly and effectively.

Successful deployment of NAS modernization requires a balanced approach comprised of healthy dialog between the vendors providing technology enhancements, the Technical Center personnel that shepherd the capabilities through the modernization process, and the air traffic controllers who are the “end users” of the technologies and capabilities which will enhance the efficiency of the NAS. These three essential elements (vendors, Technical Center, and end users) must be methodically incorporated into the deployment process. As we have seen in the recent past, under-appreciation for any one of these elements introduces significant risk that will manifest itself as the deployment process progresses. The good news is that well thought-out deployment plans that include these essential elements significantly reduce risks, as displayed in the deployments of near-term NextGen capabilities.

### **Equipment at the Technical Center**

The NAS is comprised of several different systems such as airports, aircraft, and air traffic control systems. Air traffic control is operated by humans and supported by a variety of automation systems. Each of the systems performs a unique task but must cooperate with the other systems to ensure the safe transfer of information. The Technical Center is a national asset that houses a functioning replication of each of these individual subsystems that comprise the NAS. More specifically, the Technical Center is essential for the integration, verification and validation (V&V) and testing of components that make up NextGen.

As NextGen ATC technologies are introduced into the NAS, the WJHTC plays a crucial role. The WJHTC success can be attributed to two main components: people and equipment. The blending of these core components is enhanced by the existence of key government policies that enable a balanced, transparent, safe environment for the entire process of technology enhancements. Since the NAS is a 24-7 operation, required to operate at top levels of safety and efficiency continuously, any changes or enhancements must be exhaustively and methodically tested prior to activation or deployment in the operational environment.

#### *Example: Automatic Dependent Surveillance-Broadcast (ADS-B)*

Integration of this NextGen cornerstone technology across multiple automation platforms involves Operational Testing and Evaluation. The WJHTC provides a unique combination of highly skilled personnel and multiple automation platform test beds in one location. Technical Center aircraft have also been essential to testing ADS-B in the field.

#### *Example: Airway Facilities Tower Integration Laboratories (AFTIL)*

While not an equipment program, the AFTIL project saves the FAA millions of dollars when constructing air traffic control towers, which are one component of the NAS. Controllers and airport operators are able to simulate the location of new towers before the first shovel of dirt is turned. This provides an efficient and safer operation.

#### *Example: Wake Turbulence Mitigation for Departures (WTMD)*

Wake Turbulence Mitigation for Departures (WTMD) is a wake avoidance solution for airports with closely spaced parallel runways that can significantly increase throughput. The equipment integrates input from wind sensor equipment and determines if there is an adequate crosswind to allow controllers to disregard Wake Turbulence separation on certain parallel runways. In use at airports like San Francisco (SFO) and Houston (IAH), it has been very successful in reducing departure delays during those times that the wind conditions are favorable. The equipment used by controllers for WTMD was developed exclusively at the Technical Center by FAA employees who integrated off-the-shelf equipment with wind sensor equipment already in use across the country. This was done at a per-unit price that was considerably less than a contractor could have developed it.

**Validation Verification:** This modernization step is to assess whether a system (e.g. En Route Automation Modernization (ERAM)) delivered by a private contractor like Lockheed, meets the specifications required by the FAA. When moving from a concept to a product, the government selects a contractor to produce a product that will eventually become another component of the NAS. For that to happen, the federal government must define requirements and guidelines for the

project. The vendor will produce a product they feel meets the requirements and deliver the product to the federal government. The Technical Center is used to evaluate whether the product meets the original specifications. The Technical Center is essential because they have the ability to determine whether systems from different vendors are compatible without fear of patent issues – thanks to the protections offered by the federal government, transparency and disclosure take place at the Technical Center, allowing systems to be verified and validated without fear of competition. When a vendor delivers a product to the government it is the first opportunity to see how the product functions and what the potential integrations issues may be. As an example, the first version of ERAM and Terminal Automation Modernization and Replacement (TAMR) were tested at the Technical Center to see if they could interact successfully together.

### **People At the Technical Center**

**Test and Evaluation:** Another phase of procurement is the testing and evaluation of new products. The Technical Center is able to replicate an operational air traffic facility in a laboratory environment where testing and evaluation can take place independent of live traffic. The FAA employs current air traffic controllers and other end-users to test these products in simulated air traffic conditions. This concurrent testing would be impossible to conduct in the NAS while maintaining live traffic.

#### *Example: Terminal Automation Modernization and Replacement (TAMR)*

The Technical Center provides invaluable testing and evaluation on all software and equipment that is introduced into the terminal environment. Over the past two years, their involvement and expertise has been pivotal in the successful deployment of Standard Terminal Automation Replacement System (STARS) at Dallas/FortWorth TRACON (D10). Their involvement in the development of software test plans, hardware integration and transition strategies has helped the TAMR program achieve early success. Working in collaboration with NATCA and other labor partners, the Technical Center is a vital cog in the FAA's machine as we move towards NextGen.

#### *Example: Resolving Integration Challenges*

The NAS operates daily with multiple, complex automation systems. Each is unique and, as hard as stakeholders try, it is nearly impossible to anticipate every possible ramification when significant changes are introduced. The Technical Center provides a unique environment to recreate problems reported in the operational environment, investigate causes, and research solutions. Without the availability of multiple automation test beds and key personnel in one location, progress towards the multiple facets of NextGen would be significantly hampered.

**Human Factors:** The air traffic system functions via a complex of interactions humans and machines. One major benefit of the Technical Center is it allows current controllers to be brought in to interact with new machines to assess how they interact. This allows the FAA to determine what, if any, changes need to be made before deployment in the field. This is essential because technology developed by engineers in a vacuum frequently does not interact as expected.



*Example: Engineers and Equipment Development*

Not only do the employees at the Technical Center evaluate and improve equipment, they also develop it, often producing the same type of equipment for significantly less than contractors.

*Example: DataComm*

During the concept validation phase of DataComm the WJHTC played a vital role in defining the human machine interface (HMI) of new data communication systems for pilots and controllers. The human factors scientists and laboratories at the WJHTC were uniquely suited to provide an unbiased evaluation of the critical component of the NextGen air traffic capability.

*Example: Ground-based Interval Management (GIM-S)*

Ground-based Interval Management (GIM-S) is an important application being introduced with high visibility from a number of users that leverages off of ADS-B data. Testing at the Technical Center provides the first opportunity for stakeholders, including NATCA, to evaluate an application that goes beyond concept to reality.

## **Policies**

Integration: NextGen is going to modernize the NAS by bringing in new systems or using current systems in new ways. The Technical Center ensures the smooth integration of these systems so when they move from testing to actual deployment in the field, they will behave as expected. This allows the FAA to work on adding new systems without introducing risk or interrupting the NAS.

*Example: Time based flow management (TBFM)*

Time Based Flow Management (TBFM) is a significant shift within air traffic control from the use of miles-in-trail to the use of time slots to smooth the peak demand periods. This shift in operations requires multiple computing platforms and multiple software systems. The Integration capabilities at the WJHTC provide an opportunity for competing vendors to build effective links between their respective proprietary systems. These systems can be effectively tested during the integration phase prior to operational deployment within the NAS.

## **Conclusion**

The last four years of intensive complex system deployment have revealed fundamental truths across multiple automation platforms. Regardless of the automation platform, ERAM, TAMR, ADS-B, TBFM, DataComm, Advanced Electronic Flight Strips, Terminal Flight Data Manager, NAS Voice System, Automated Terminal Proximity Alert, or programs such as Wake Turbulence Mitigation, one theme connects them all. The role of the Technical Center as both a facilitator and enabler of NAS modernization is essential. The Technical Center is the only place where vendors and current air traffic controllers have the opportunity to interact with FAA experts across all of the domains that make of our National Airspace System. NATCA believes the WJHTC is providing invaluable opportunities at all stages of development, testing, and deployment, and we look forward to continued collaboration and cooperation.