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NextGen for Airports, Volume 1: Understanding the Airport's Role in Performance-Based Navigation: Resource Guide

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7 Stakeholders and Challenges in PBN Implementation

A broad range of stakeholders in PBN were surveyed in order to understand their levels of knowledge, perspectives, and attitudes regarding PBN and airport operations. Stakeholders surveyed included airport operators, aircraft operators, aviation regulators, procedure designers and implementers, system operators, researchers and developers, avionics and aircraft manufacturers, airline technical pilots, and environmental and noise groups. The findings from the survey provided insight into the nature and extent of airport involvement in the flight procedure design and implementation process. The findings describe the knowledge and understanding of key stakeholders in flight procedure design and implementation, including airport operators, aircraft operators, and communities as well as challenges regarding PBN procedure implementation. The findings are summarized in the sections below.

Stakeholders

Immediate stakeholders in the design and implementation of flight procedures include airport operators, aircraft operators, and the community. This section documents the concerns of each of these stakeholders and the high-level contributions that each may make to the development and implementation of procedures.

Airport Operators

The involvement of airport operators benefits procedure design by potentially enabling the maximum achievable environmental benefits given local constraints, allowing for community buy in, and aiding in the seamless implementation of FAA's NextGen Program. Typical concerns of airport operators and high-level guidelines for their engagement in developing procedures are detailed below.

Concerns

The concerns of airport operators related to the design of flight procedures serving their airport include efficient access of passengers and aircraft to the NAS, meeting environmental requirements for the airport, satisfying the needs of the communities proximate to the airport, maximizing airport revenue, and minimizing operational costs of the airport.

Contributions

Airport personnel can address these concerns by engaging in the procedure development process. The airport operator is recognized as a primary stakeholder in PBN development through the FAA's 5-phase PBN Implementation Process (FAA Order 7100.4) and the Standard Operating Procedure for Safety

Risk Management Under the FAA Office of Airports (ARP) Safety Management System (ARP SOP 4.00). To engage meaningfully and proactively in the procedure design process, airport representatives must be sufficiently knowledgeable of PBN. While the involvement of airports is particularly important in the initial specification and preliminary design of the PBN procedures, airport representatives should be engaged from inception of the procedure development project all the way through to post-implementation assessment of the procedures. Airport representatives may best participate in procedure development through a targeted FAA stakeholder engagement process, perhaps as part of the FAA's 5-phase process. The PBN development process will be sponsored and managed by FAA's procedure design team. In procedure development projects undertaken by institutions such as FAA or an aircraft operator, the airport will typically assume an advisory role in development process. However, the airport could assume a lead role in a procedure development projects it initiates. In an advisory role, the airport will advise the design team of important considerations for the airport and local airspace, such as noise-sensitive areas. The involvement of airports in the procedure development process should not extend the time for design and implementation of the procedures or delay the benefits of implementing the procedures. When advising regarding the procedure design, airports and all other stakeholders should consider the interests of all stakeholders: industry and community, local and national. This includes considering the larger benefits of PBN procedures beyond the local domain of the airport. Airport authorities should understand the design trade-offs that are required to ensure that the greater NAS benefits of capacity, access, and flight efficiency potentially afforded by PBN procedures are not excessively compromised in meeting the local needs of the airport. Depending on the project and the community and other stakeholders involved, the greater needs of the NAS may or may not justify varied levels of impact on the ground.

Airport operators can contribute to flight procedure design and implementation through local knowledge, environmental analysis, and infrastructure planning and investment. Regarding local knowledge, the airport can contribute knowledge of local operational considerations and constraints concerning the airfield and local airspace to support baseline operations characterization. The airport operator can support specifying design objectives, constraints, and performance metrics. The airport operator can also assist in identifying operational and environmental impacts of proposed procedures to the airport and community. Local knowledge useful to the development project may include preferred runway configurations and routes, obstructions, noise-sensitive areas, aircraft operator characteristics, concerns of the community, and current and forecasted equipage types and traffic levels at the airport. Airport operators can also review proposed procedure designs to be sure they are compatible with noise abatement procedures, land uses, and the concerns of surrounding communities; that the procedures are useful to aircraft operators; and that the lowest minimums have been achieved in the design of approach procedures. Regarding environmental analysis, airport personnel may conduct local studies, such as noise or traffic flow analyses, to support the design, implementation, and cost-benefits analysis of the procedures and to monitor the environmental impact of the implemented procedures. Airport operators may also fund the EA of the proposed procedures to contribute to their implementation. Regarding infrastructure, airports may conduct airport planning and infrastructure investment to support realizing or maximizing the benefits of the procedures.

Airport operators can also contribute to flight procedure design through outreach to local FAA personnel and nearby communities. Regarding outreach to local FAA personnel, the airport operator can establish and maintain relationships with the local FAA Service Center (eastern, central or western), the terminal radar approach control (TRACON) facility manager and air traffic control tower (ATCT) representatives to understand the local airspace, collaborate in procedure design, and conduct outreach with the community. Regarding outreach to communities, airport personnel can identify local persons or groups representing the community and conduct outreach to those individuals or organizations. This is often better than outreach to the general public. The airport staff can educate the community regarding the capabilities and benefits of PBN. Community outreach and education should include

basic information that explains varying levels of aircraft equipage and the aircraft capabilities and limitations for the intended operations. Airport personnel may also brief the community on designed procedures, obtain the understanding and approval of the community at different stages throughout the design process, and hold follow-up meetings with the community as part of the post-implementation assessment of the procedures.

Communities

Input from community representatives is valuable in helping to ensure that the needs of the community are understood and considered in the procedure design. Typical concerns of the community and high-level guidelines for their engagement in procedure development are detailed below.

Concerns

The concerns of communities proximate to airports regarding flight procedure design include the concentration of aircraft noise, increases in air traffic, local air quality, and the presence of air traffic.

Contributions

Communities can address these concerns by being aware of and understanding the procedure development project and having opportunities to voice their concerns. It is important that the flight procedure implementation process is transparent to the community to allow them to feel that they have a stake in the implementation of procedures. It is better to have the community participate through representative bodies, such as noise forums, city councils, planning divisions, or other organizations rather than in an ad-hoc manner. Such representative bodies are informed about land use and noise sensitive areas within communities that will potentially be affected by the procedures and therefore can contribute constructively. Representative bodies also offer the opportunity for education regarding PBN, airport operations, and other matters, which is more difficult with ad-hoc or general public audiences. Input from community representatives is valuable to ensure the needs of the community are met in the procedure design. Input from the community is typically more valuable in the initial stages of the procedure design. Input may also be valuable in post-implementation assessment of procedures to validate the planned results. While NEPA provides a framework for community engagement as part of the EA process, outreach efforts beyond those satisfying NEPA requirements is advisable.

Aircraft Operators

Aircraft operators are typically a project sponsor and may design their own procedures for an airport. Typical concerns of aircraft operators and high-level guidelines for their engagement in procedure development are detailed below.

Concerns

Aircraft operators want to ensure the usability of the published procedures. They typically want designs that they can use and that are approved by ATC. Additional concerns of aircraft operators include design for fuel and time savings as well as providing reliable access to airspace and airports. Aircraft operators are also concerned with the aircraft equipage required and the costs of training crew members to fly the procedures. Most aircraft operators have equipped their aircraft to fly PBN procedures in en route and terminal airspaces, and many operators have policies encouraging the use of PBN

procedures. However, the particular equipage for different types of approach procedures varies among operators, and usage policies among operators and pilots vary as well.

Contributions

Aircraft operators can contribute site-specific information fundamental to the procedure design including defining their normal operations, understanding of their flight planning process, the capacities of their aircraft, the typical weights and climb profiles of their aircraft, and the current and planned PBN capability levels of their fleet. In addition, aircraft operators can conduct flyability assessment of proposed procedures to determine their operational viability. Aircraft operators can participate with airport operators to provide accurate operational information as part of a community outreach program during public meetings.

Other Stakeholders

The RTCA NAC recently published the *Blueprint for Success to Implementing PBN Procedures* (RTCA 2014). This document provides useful descriptions of technical and non-technical stakeholders and recommendations for outreach to those groups. Non-technical stakeholders include the public, community groups and non-governmental organizations, airport authorities, airport advisory boards, and local, state and federal government officials. Technical stakeholders include industry representatives, including the lead operator, Airlines For America (A4A), the National Business Aviation Association (NBAA), the Regional Airlines Association, airport authorities, air traffic facilities, pilot unions, the Department of Defense, third-party procedure developers, and others.

The document provides three recommendations for working with or considering non-technical stakeholders, eight recommendations for working with or considering technical stakeholders, eight recommendations for PBN implementation outcomes and assessment metrics, six recommendations for capturing lessons learned from individual implementation efforts and applying them to future efforts, and three additional recommendations for checklists to support the procedure implementation process, including accommodating flight procedures implemented under special programs for different circumstances.

The FAA has recently responded to the NAC with full concurrence on all of the non-technical stakeholder recommendations, full concurrence of seven and partial concurrence on one of the technical stakeholder recommendations, full concurrence of one and partial concurrence of seven of the outcome and metrics recommendations, full concurrence of three and partial concurrence of three of the lessons learned and future effort recommendations, partial concurrence of one and full concurrence of one checklist recommendations, and full concurrence on the special procedures recommendation.

Challenges

Numerous challenges to implementing PBN procedures were identified in the stakeholder survey. Airport operators should be aware of these challenges when proposing or engaging in the development of PBN procedures. The categories of these challenges include planning, outreach, technical design, utilization, and process.

Planning

Understanding the FAA's planned and actual time frames for implementing PBN procedures and other NextGen capabilities helps for airport master planning and Federal Aviation Regulation (FAR) Part 150 studies, and land use planning by local jurisdictions.

An airport master plan should consider the timing and effects of PBN implementation on airport capacity and traffic demand, facility requirements, alternatives, noise, and implementation schedules for major capital improvements. This will ensure that airport infrastructure will meet the needs of the potential increase in operations enabled by PBN.

A FAR Part 150 Noise Compatibility Study should consider PBN airspace alternatives designed to avoid noise-sensitive land use areas and thereby reducing the overall impact of noise on a community. Planning PBN noise abatement alternatives prior to the implementation of a metroplex or other PBN implementation project is prudent. The alternatives may be considered as part of the design phase, taking advantage of the resources available through the process.

A good example demonstrating this concept is the case of the Louisville International Airport FAR Part 150 program, completed in the early 2000s. Shortly after the completion of the Part 150 project, the FAA began an unrelated initiative to implement RNAV SIDs and STARs at the airport. The Louisville Regional Airport Authority was able to work with the local FAA representatives and the design team to influence the development of the SIDs to include some of the recommendations and noise initiatives contained in the FAR Part 150 study while capturing the air traffic efficiencies intended. These procedures were developed and implemented in the late 2000s and have been effective in mitigating noise and increasing throughput.

All PBN planning efforts should consider tradeoffs associated with implementation. As previously discussed, negative effects of PBN implementation may include a concentration of noise over a small area where there was previous dispersion of noise. It is imperative that these issues be addressed and understood, and mitigation methods analyzed for these situations.

Outreach

Challenges in outreach include community opposition and resources. Community opposition to PBN procedures may be due to limited knowledge and understanding and can hamper the implementation of procedures. Outreach to communities prior to and throughout the procedure development process can help to obtain their understanding and approval. However, this may require significant resources depending on the nature of the project and level of interest and concern of the community. Educating the community on the benefits associated with PBN is paramount; airports typically have outreach programs and procedures in place, which can be leveraged to support PBN outreach efforts.

Technical Design

Challenges in technical design may include PBN procedure requirements, aircraft performance differences, and stakeholder needs. Regarding procedure requirements, when coupled with local terrain and airspace constraints, it is possible that the procedures may be operationally challenging or infeasible to implement, or may have high ceiling and visibility requirements. Regarding aircraft performance, different aircraft and their FMS's can exhibit performance differences while flying the same procedure. Accounting for the breadth of performance differences in the design and evaluation of the procedures can be challenging. Regarding stakeholder needs, achieving the benefits of the proposed procedures, while adjusting their design to meet the needs of all the stakeholders without compromising the design objectives, can be challenging.

Utilization

Challenges in utilization are aircraft equipage and ATC. Regarding equipage, being able ultimately to use PBN procedures that were implemented depends on the levels of equipage among the aircraft fleet at the airport. The decision to implement a particular PBN procedure is often dependent on the accuracy of predicted aircraft equipage levels. Regarding ATC, utilization depends upon the ability of ATC to manage aircraft flying PBN procedures with high traffic volumes and mixed equipage. Specialized tools and operations may be required to enable controllers to manage traffic.

Process

Challenges in the procedure development process are numerous and include the following key examples. First, it can be challenging to adequately define the design objectives, characterize the baseline operations and use of the legacy procedures, and assess the benefits. Second, given the breadth and potentially differing perspectives of the procedure design team members, conflicts and challenges may occur in coordination and execution during design and implementation of the procedures. Third, the design and EA processes can be lengthy and involved. Fourth, often there are insufficient budgets and timelines allocated for implementation and training of pilots and controllers in use of the new procedures, which can pose a significant impediment to utilization of the procedures. Lastly, developing methods and criteria for post-implementation assessment of the procedures can be challenging.