

飞行技术与程序部

基于性能的导航最新进展

呈给： 中美航空新技术论坛

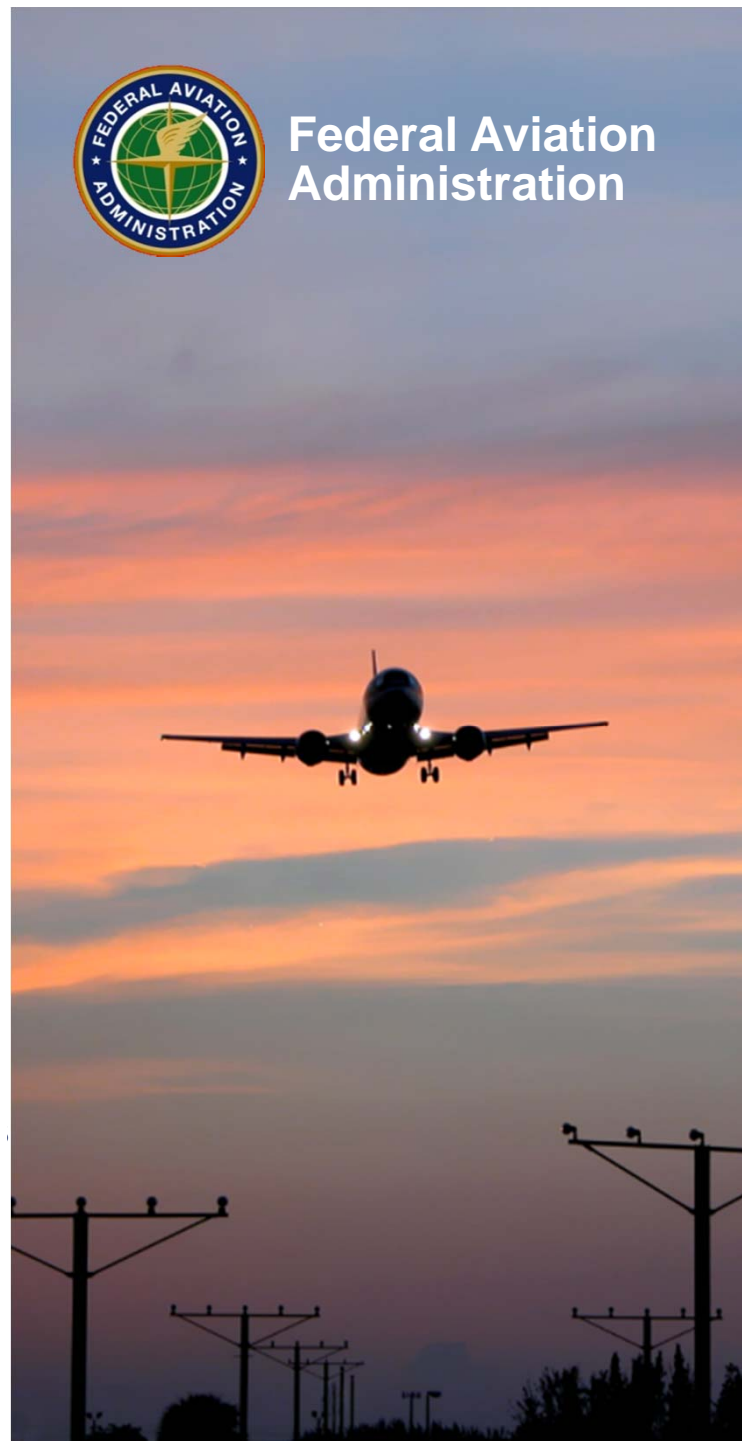
作者： 约翰·斯维加特（John Swigart）

基于性能的飞行系统分部执行经理，
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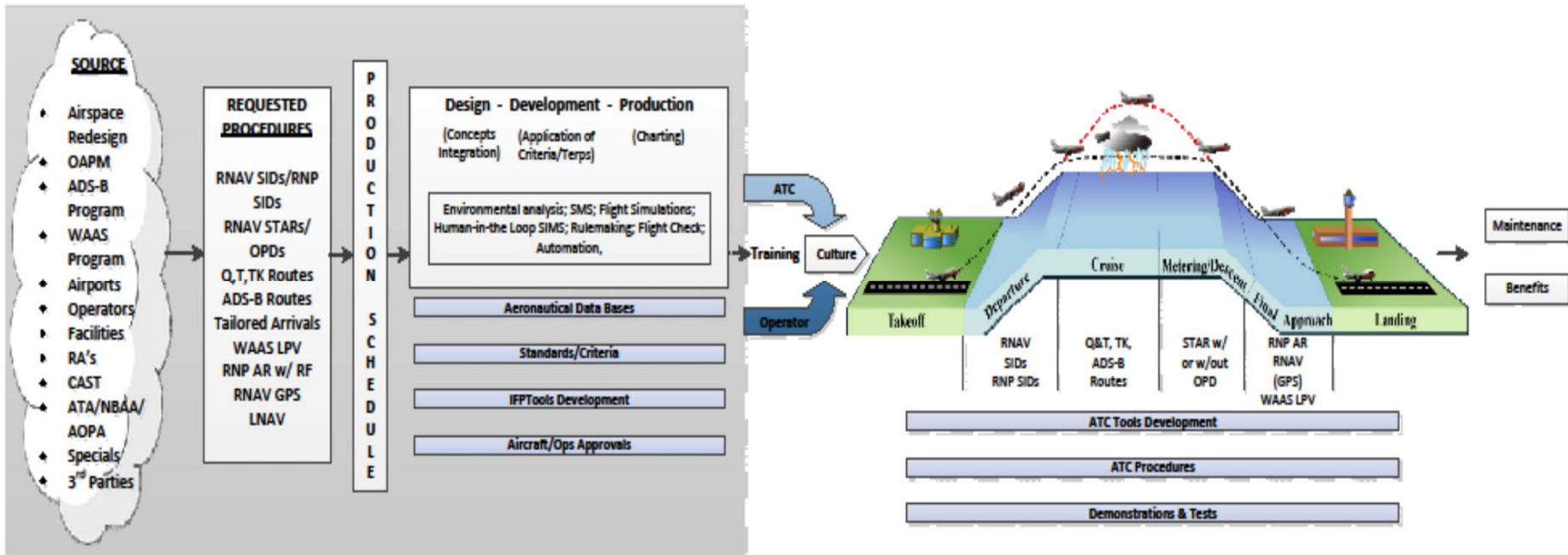
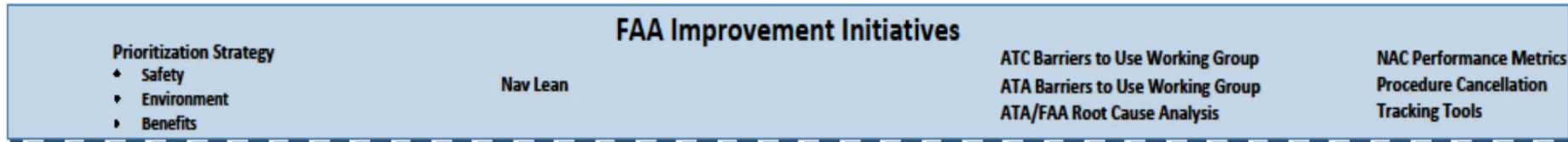


概述

- 现状
- 运营方审批的最新情况
- 指导材料



基于性能的导航



美国国家空域系统中PBN航线和程序的现状



- PBN 现有航线： 408条SID航线; 367条STAR航线; 305条RNP AR航线; 296条RNAV 航线（包括82条Q航路, 73条T航路和2条TK航路）
- 超过9,000套LPV、LNAV/VNAV和GPS程序

RNAV 1 和 RNP AR 授权状况

- **838** 家美国运营商和**90**家国外航空公司拥有 **RNAV 1** 离场和进场程序授权
- 近**2,300**架飞机涉及**RNP AR**审批



RNAV 1 和 RNP AR 授权状况

- **11家航空公司**（包括**2家国外航空公司**）
已获得在美国的**RNP**运营许可
 - 空客 A-320
 - 波音 737NG、757、767和777
 - 庞巴迪 Q-400
 - 安博威 E-170/190
- **22家企业用户、包机公司和极少数运营商**
 - 湾流 G-350/450/500/550
 - 波音737NG和777



未来PBN相关工作

- 近期

- 继续更新FAA咨询通告（AC）、监察员指导和其他相关标准和准则
- 提高RNP AR程序以外沿固定半径飞至定位点程序的使用
- RNP AR 离场程序



未来PBN相关工作

- 中远期

“高级RNP”将利用现代化飞机的能力，与RNP AR相比所需“管理经费”更低

提问?



航空安全 (AVS) 指导材料

Performance Based Navigation (PBN)

ICAO Navigation Specification (from Doc 9613 PBN Manual)		Ops/Airworthiness and Procedure Design ¹ (Additional guidance may also apply in the form of ACs, TSOs, etc.)	Planned Updates in FY12 and FY13 (not including updates to Order 8900.1 and OpsSpecs/MSpecs/LOAs)
Nav Spec / Attachment	Flight Phase(s)		
RNP APCH [to LNAV/VNAV, LNAV, LP, and LPV lines of minima]	Approach	AC 90-105 Note 2: Basic-RNP 1 designated as RNP 1 in United States Order 8260.54A	AC 90-105A <ul style="list-style-type: none"> Advanced RNP (Scaleable RNP + Baro-VNAV + current and additional advanced features) RNP 0.3 (Helicopter) RNP 2 Additional "advanced features" –RNAV holding, lateral offset, TOAC/RTA, and fixed radius transitions Baro-VNAV +/- 75' (optional?)
Baro-VNAV [Attachment]	Approach	AC 90-107 (for LPV and LP) Order 8260.54A	AC 90-107 (for LPV and LP) <ul style="list-style-type: none"> PinS-HLPV Update
Radius-to-Fix (RF) ² [Proposed Attachment]	Departure, Arrival, and Approach (except final and 1 st segment of MA)		Order 8260.PBN <ul style="list-style-type: none"> Scaleable accuracy RNP 0.3 RNP 2 RNAV Holding Update FRT PinS/HLPV
Basic-RNP 1	Departure and Arrival		
Advanced-RNP 1* [Renamed as Advanced RNP]	Departure, En Route, Arrival, and Approach (except MA)		
RNP 0.3* [May be helicopter specific]	Departure, En Route (limited or not at all), Arrival, and MA		
RNP 2*	En Route (Primarily Remote or Continental)		
RNP AR APCH [RNP AR Departures]	Approach (Departure and Arrival TBD)	AC 90-101A Order 8260.52	AC 90-101B For RNP AR Departures Order 8260.PBN
RNAV 1 and RNAV 2	Departure, En Route, and Arrival	AC 90-100A Order 8260.44 (for Departure, Arrival TBD) Order 8260.3 (for En Route)	AC 90-100 Chg 1 (or -100B) - RAIM updates, Gulf Q-route changes, and Tailored Arrivals Order 8260.44 Order 8260.PBN
RNAV 5	En Route (N/A for U.S.)	AC 90-96A N/A	N/A N/A
RNP 4	Oceanic Remote	Order 8400.33 N/A	TBD - NAT N/A
RNAV 10 [Designated as RNP 10]	Oceanic Remote	Order 8400.12B N/A	TBD –WATRS, GOMEX, and NP/CP N/A

*Draft

¹ Orders 8260.19 and 8260.46 also apply

² Associated with RNP APCH (optional capability and outside final), RNP 1 (optional capability), RNP 0.3 (optional capability), and Advanced-RNP (required capability)

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