

Rotorcraft and Propeller-Driven Aircraft in NextGen

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With Support From



Outline

- **JPDO/NextGen overview**
- **IPSA environmental analysis approach**
- **Rotorcraft-specific issues and concerns**
- **Propeller/open rotor-specific issues and concerns**

What is the JPDO?

The Joint Planning and Development Office (JPDO) was established to execute the *Next Generation Air Transportation System (NGATS; a.k.a NextGen) Integrated Plan* which was delivered to Congress in December, 2004

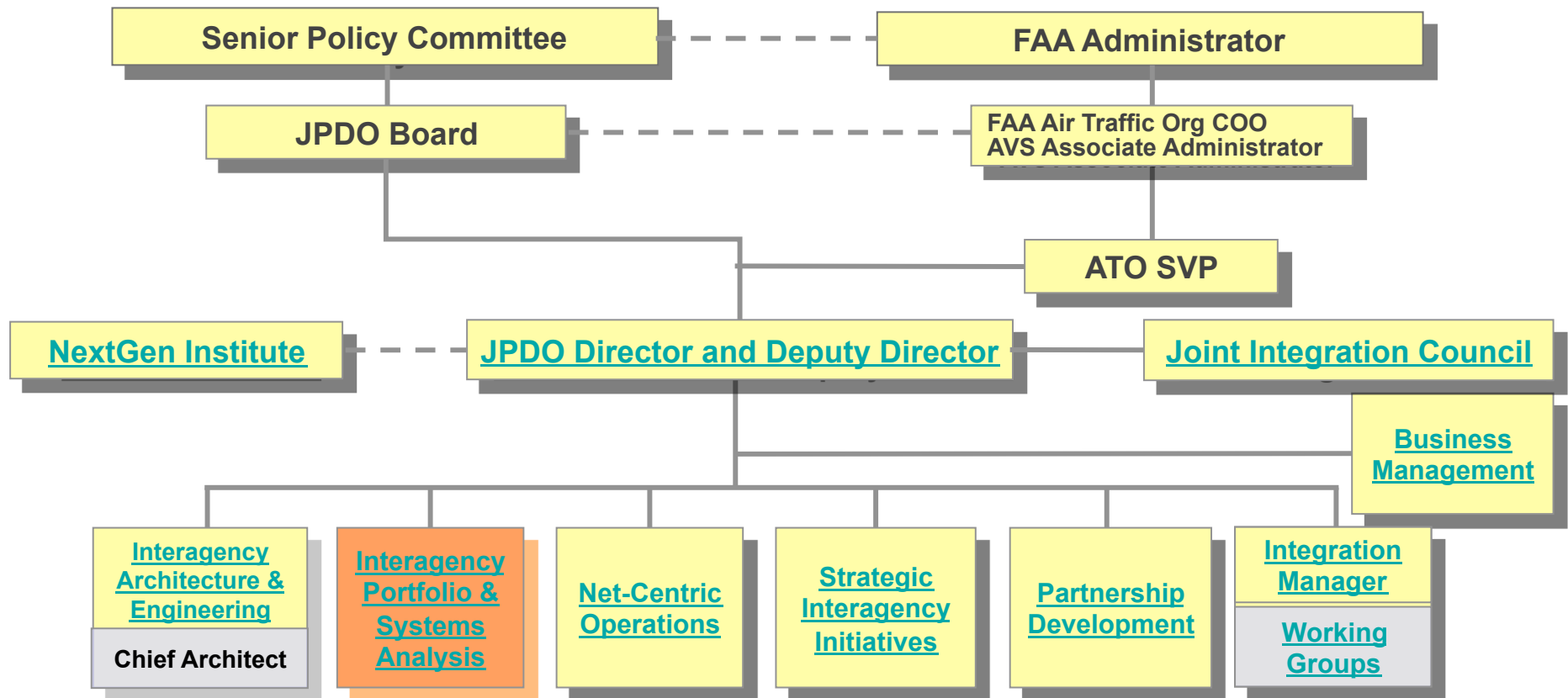


NGATS Vision/Goals:

A transformed air transportation system that provides services tailored to individual customer needs, allows all communities to participate in the global economy, and seamlessly integrates civil and military operations



JPDO Organization



Governance

- Senior Policy Committee
- JPDO Board of Directors

Industry Leadership

- NextGen Institute Management Council (IMC)

Interagency Coordination

- CIO Board
- Joint Architecture & Engineering Board



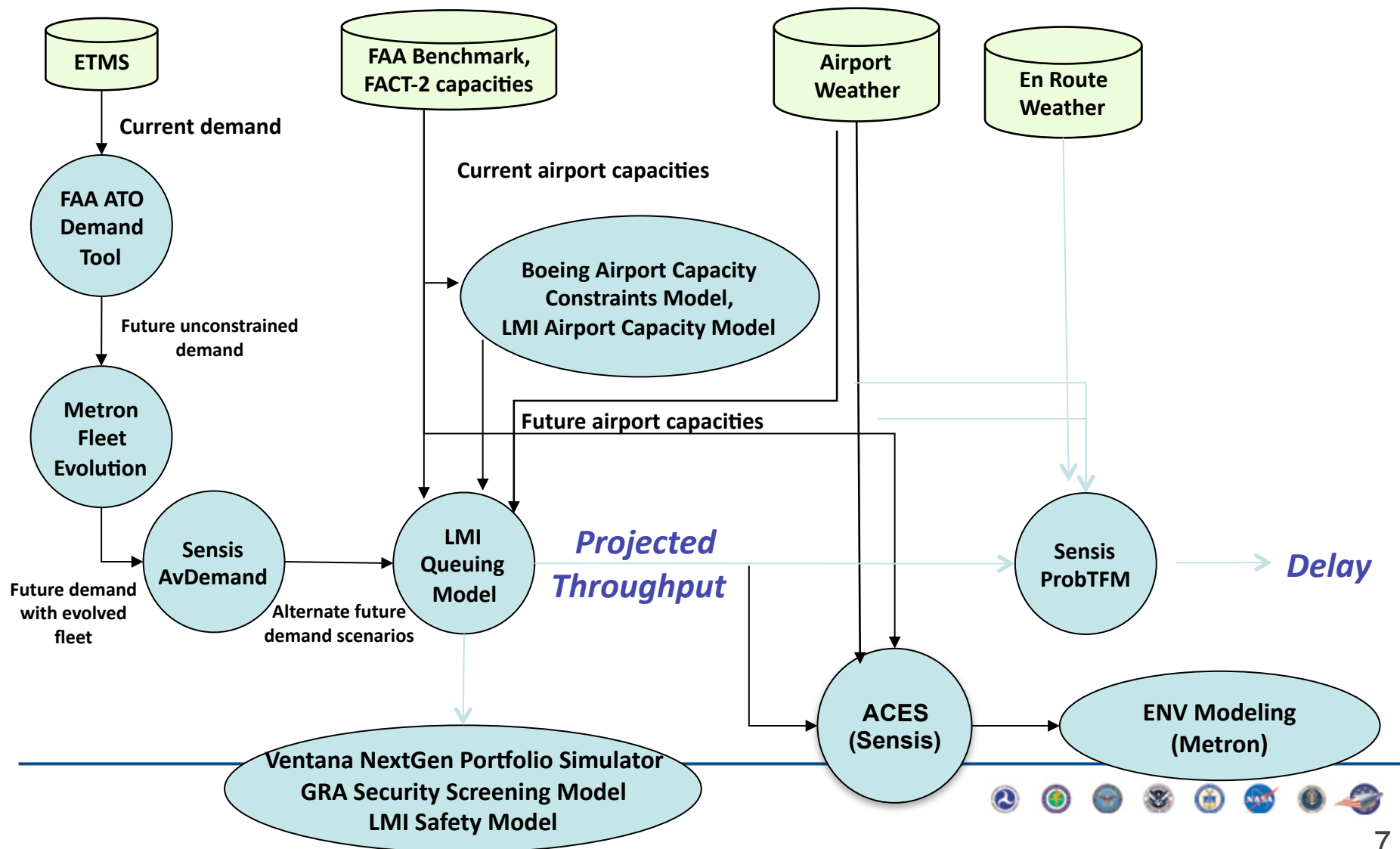
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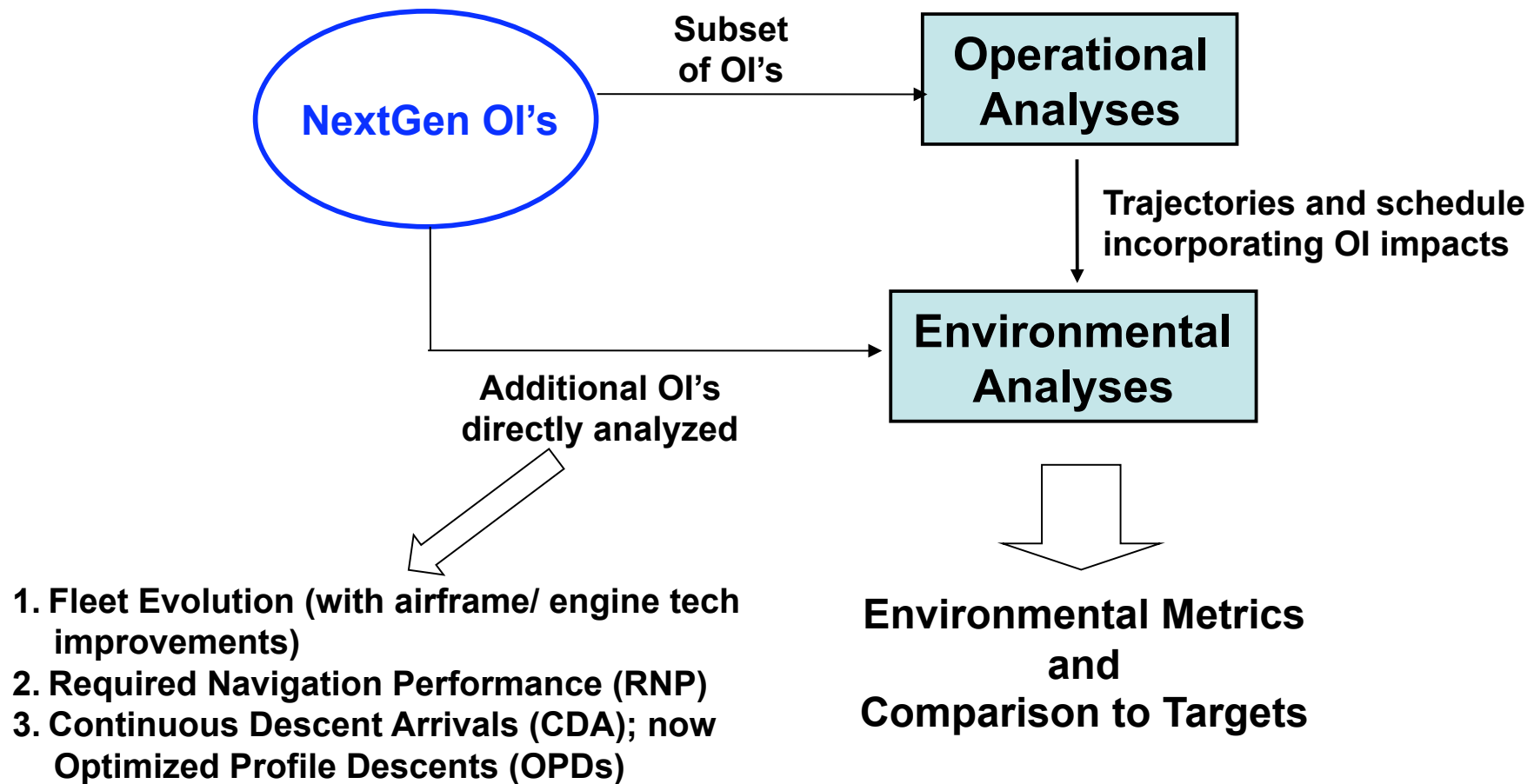
Summary of IPSA Analysis Approach

- Future demand scenarios are generated using FAA forecasts.
- Future baseline and NextGen airport capacities are estimated based on an airport capacity constraints analysis and performed in coordination with the FAA and Mitre for the years 2025 and 2050.
- NextGen performance related to capacity is evaluated using NAS-wide simulations.
 - Airport capacities based on the aforementioned airport constraints analysis
 - En route capacities based on prior FAA, NASA, Mitre and IPSA analyses
- NextGen performance related to environment is evaluated based on the NAS-wide analysis using a suite of environmental modeling tools
- Metrics of interest are derived from the NAS-wide analysis of throughput and delays. Metric for noise is “number of people exposed to at least 65 dB Day-Night-Level”, and is only analyzed in the vicinity of current airports (within 20 mile radius). A standard FAA analysis tool (Noise Impact Routing System—NIRS) is used for the IPSA analyses. Transition to FAA’s Aviation Environmental Design Tool (AEDT) is planned.
- A more detailed explanation of the current IPSA environmental modeling process can be found in NASA CR-2010-216184

IPSA Integrated Modeling Tools



Portfolio Modeling: Operational Improvements (OI's)



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Rotorcraft-Specific NextGen Issues/Concerns*

- Current IPSA modeling is virtually all scheduled CTOL traffic
 - Most current rotorcraft ops are treated as GA, and don't occur from major airports
 - Injecting future rotorcraft demand will be critical to a NAS-wide assessment for these vehicles
- Under a NASA NRA, Sensis Corp. (with several subcontractors) assessed the future impact of a Large Civil TiltRotor (LCTR) in the NAS (contract NNA08BA64C)
 - Modeled LCTR flying into a new 600' runway into airports in the NY metroplex airspace
 - Final report in preparation—many results presented at NASA Airspaces Systems Technical Interchange Meeting; 10/12-16/2009. Very limited noise results available to date—not easily expandable to a NAS-wide assessment.
- Other rotorcraft potential issues wrt NextGen
 - All rotorcraft: Integrating demand, capacity, and flight tracks into a NAS-wide analysis (similar problem for most VFR GA traffic as well)
 - LCTR-specific: Along with improved, validated noise modeling capability, will very low frequencies require en-route modeling? (already a r/c issue in noise-sensitive areas like national parks; may be a problem for LCTR even at altitude). En-route modeling would be a HUGE computational/modeling issue.

*** These are the opinions of the author, and NOT an official NASA position**

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Propeller-Specific NextGen Issues/Concerns*

- Current IPSA modeling is virtually all scheduled CTOL traffic
 - Only propeller-driven aircraft in our analyses are the smaller commuter vehicles (DHC-8, etc.)
 - Our current analysis only has three such vehicles still entering the fleet in the future: ATR42, ATR72, and DHC8
 - Insertion of future replacement propeller-driven aircraft could easily be done by replacing a percentage of an existing seat-class of aircraft—comparable noise model (vehicle description within NIRS/AEDT) required.
- Other potential issues wrt NextGen for “open rotors”
 - Similar concerns as with LCTR: Along with improved, validated noise modeling capability, will the low frequencies generated by these vehicles require en-route modeling? Such en-route modeling would be a HUGE computational/modeling issue...
 - How they fly: If these large open-rotor-propelled aircraft don't have the same climb-out performance as the turbofan vehicles they're replacing, the duration factor in the noise metric will exacerbate any other noise issues with these vehicles.

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Backup Charts

Key Drivers for NextGen Modeling

- **Airport Capacity Improvements**

- Airport capacity improvements were based on a bottom-up OI analysis & their operations impacts
- Assumptions and analysis were coordinated with FAA and MITRE, and performed by IPSA
- Significant improvements in airport capacities (AAR/ADR) in all weather conditions (IMC/MVMC/VMC) are achieved with NextGen

- **Flight Demand Adjustment (Flight Trimming)**

- Future demand is based on FAA Terminal Area Forecast (TAF)
- Throughput is restricted (1.2 D/C limit for the quarter-hour and 0.9 for the rolling hour) to keep delays at a reasonable level;
 - Baseline (most) trimming is consistent with baseline capabilities (no new runways) while
 - NextGen (least) trimming is based on NextGen capabilities (new runways)

- **Fleet Evolution**

- Fleet Forecast was derived from the FAA Aerospace Forecast as provided by MITRE
 - The 2007 Forecast was used for the 2025 analysis; the 2008 Forecast was used for 2050.
- Three levels of fleet evolution were applied for 2025
 - (a) Baseline /No new technology, (b) FAA CLEEN/ NASA N+1 and (c) NASA N+2.
- New technology aircraft were inserted beginning in 2016 for both CLEEN/N+1 and N+2.
 - NOTE: It is recognized that the NASA N+2 technology improvements are not scheduled to be ready by 2016, but were included here in that timeframe as a “what if” scenario. Only baseline and N+1 were used for 2050.