

TOOL SUITE OVERVIEW



Federal Aviation
Administration

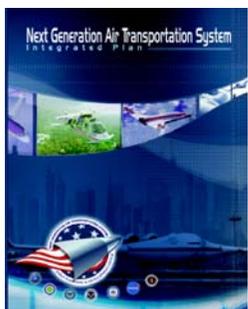


Presented to: AEDT-APMT Workshop #4

By: Dr. Lourdes Q. Maurice

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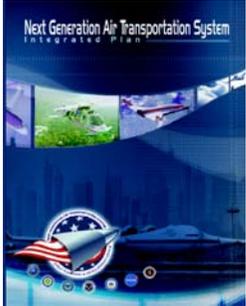
Aviation Environmental Goals *and* *Role of R&D*



- More effectively measure and characterize noise and emissions.
- Develop operational procedures to reduce noise and emissions
- More effectively assess and communicate environmental effects, interrelationships, and economic consequences based on integrated cost-benefit analyses.
- Facilitate international agreements on standards, recommendation practices, and mitigation options.
- Enable more informed Federal policy and budgetary decision-making.



Aviation Environmental Goals *and* *Role of Tools*



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Motivation for improved methods

- **Aviation benefits and environmental effects result from a complex system of interdependent technologies, operations, policies and market conditions**
- **Policy and R&D options considered in a limited context**
 - only noise, only local air quality, only climate change
 - only partial economic effects
- **Actions in one domain may produce unintended negative consequences in another**
- **Tools and processes do not support recommended practice**
 - NPV of benefits-costs is recommended basis for informing policy decisions in U.S., Canada and Europe



New Tool Suite Development Drivers

#1 CAEP

Committee on Aviation Environment Protection (CAEP) assists the ICAO Council in the development of standards, recommended practices and procedures, and guidance material on aircraft noise and aircraft engine emissions.



Future actions could include (CAEP/8?):

- A new noise standard
- A new NOx LTO standard
- A new NOx cruise standard
- A new particulate matter (PM) standard
- Phaseouts
- Use of market-based options and the 'balanced approach'



New Tool Suite Development Drivers

#2 NGATS

The Next Generation Air Transportation System will provide services tailored to individual customer needs, allows all communities to participate in the global economy, and seamlessly integrates civil and military operations.



Factors:

- Desired 3X increase in system by 2025 constrained by environment
- Fundamental changes in the nature of the system
- Environmental Integrated Product Team (E-IPT) vision to provide environmental protection that allows sustained aviation growth



Tools and Requirements - *Current*

Tools	Requirements
Emissions Dispersion Modeling System	<ul style="list-style-type: none"> • CAEP Requirements • Clean Air Act • NEPA • State Implementation Plan (SIP) Development
Integrated Noise Model	<ul style="list-style-type: none"> • CAEP Requirements • Part 150 and Part 161 • NEPA • GCNP Overflights • Air Tour Management Plan
MAGENTA	<i>Model for Assessing Global Exposure to Noise from Transport Airplanes</i> <ul style="list-style-type: none"> • CAEP Applications • DOT Noise Performance Goal
System for assessing Aviation Global Emissions	<ul style="list-style-type: none"> • CAEP Applications • FAA Flight Plan Emissions Goal • United Nations Framework Convention on Climate Change (UNFCCC)



Tools and Requirements – *Next Evolution*

Tools	Requirements
Emissions Dispersion Modeling System	<ul style="list-style-type: none"> • CAEP Requirements • Clean Air Act • NEPA • State Implementation Plan (SIP) Development
Integrated Noise Model	<ul style="list-style-type: none"> • CAEP Requirements • Part 150 and Part 161 • NEPA • GCNP Overflights • Air Tour Management Plan
EDS-AEDT-APMT	<ul style="list-style-type: none"> • CAEP Requirements • DOT Noise Performance Goal • JPDO
	<ul style="list-style-type: none"> • CAEP Applications • FAA Flight Plan Emissions Goal • United Nations Framework Convention on Climate Change (UNFCCC)



Tools and Requirements – *Long-term*

Tools	Requirements
EDS-AEDT-APMT	<ul style="list-style-type: none"> • CAEP Requirements • Clean Air Act • NEPA • State Implementation Plan (SIP) Development
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Tool Suite Development Team



BB&C



mvaconsultancy

Vital Link
Policy Analysis



HARVARD SCHOOL OF
PUBLIC HEALTH



Partnership for AiR Transportation Noise and Emission Reduction

An FAA/NASA/TC-sponsored Center of Excellence



Desired Tool Suite Characteristics

- **Build on existing capabilities**
- **Internationally-accepted**
- **Inclusive, not competitive**
- **Transparent**
- **Rigorous**
- **Explicitly represent uncertainty and different viewpoints**

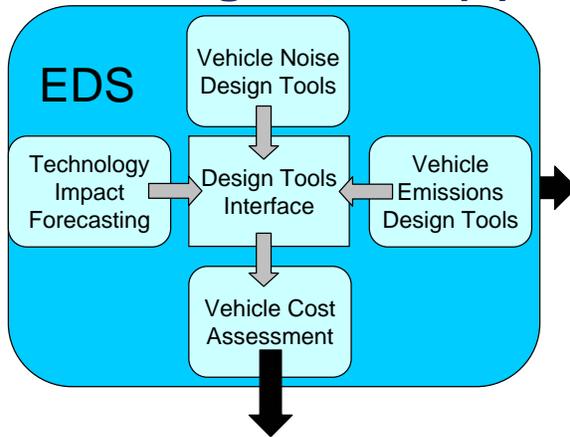


Balancing objectives

- **Transparency vs. complexity**
- **Practicality vs. thoroughness**
- **New methods vs. existing practices**
- **The framework is general, but our development approaches lean towards**
 - Transparency
 - Practicality
 - New methods AND incorporation of existing practices



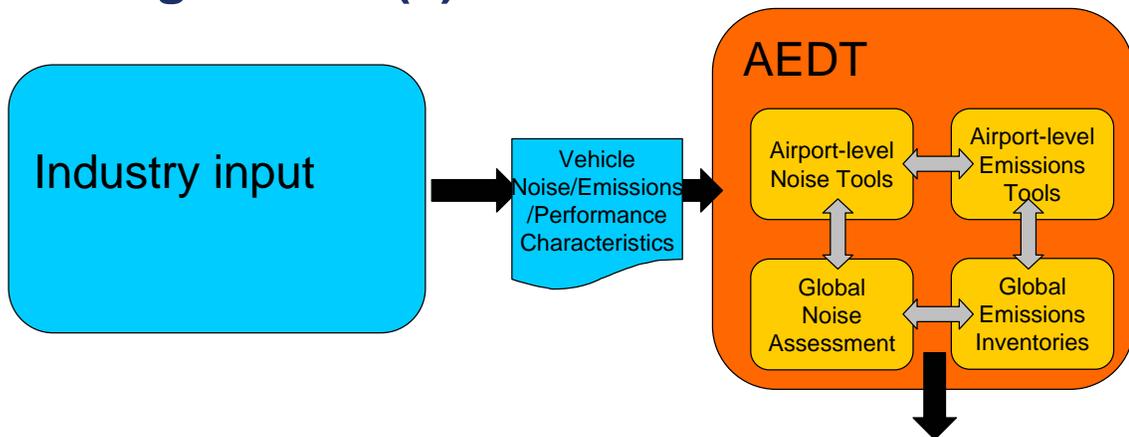
Building Blocks (1)



What are the environmental implications of this design?

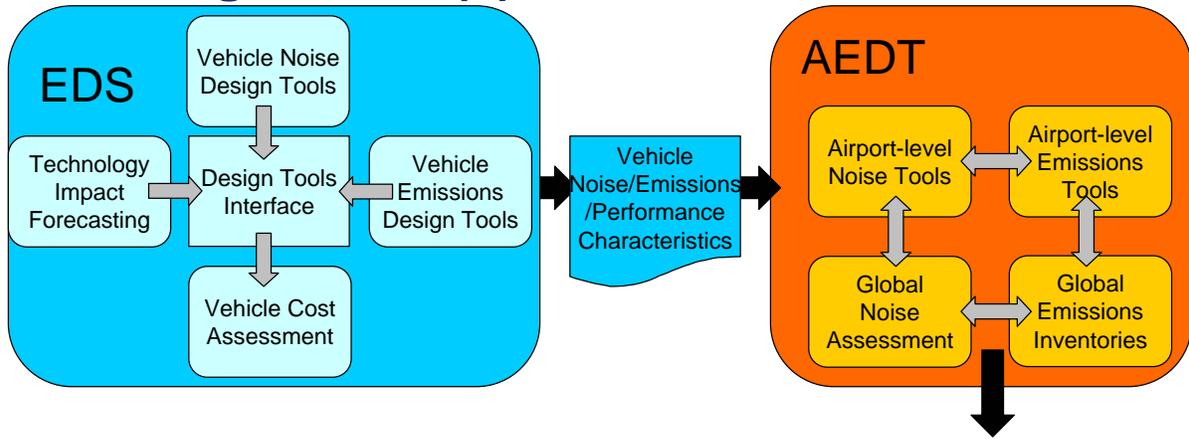
What are the costs associated with this design?

Building Blocks (2)



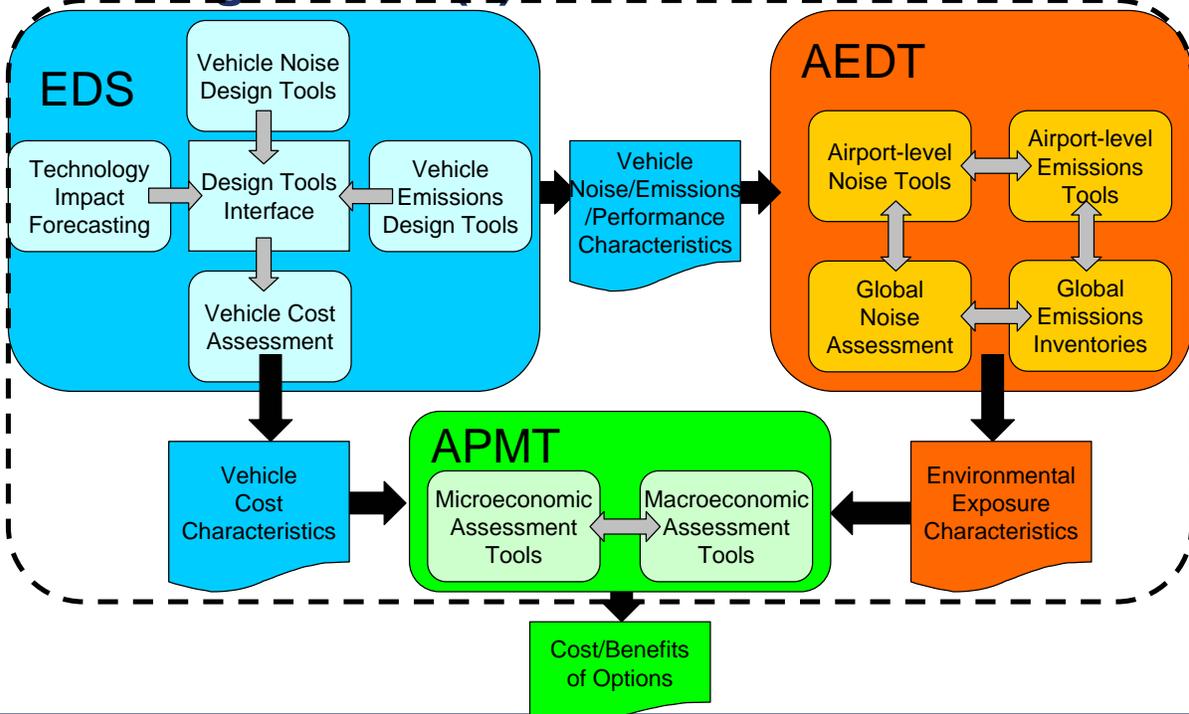
What are the noise and emission characteristics?

Building Blocks (2)



What are the noise and emission characteristics?

Building Blocks (3)

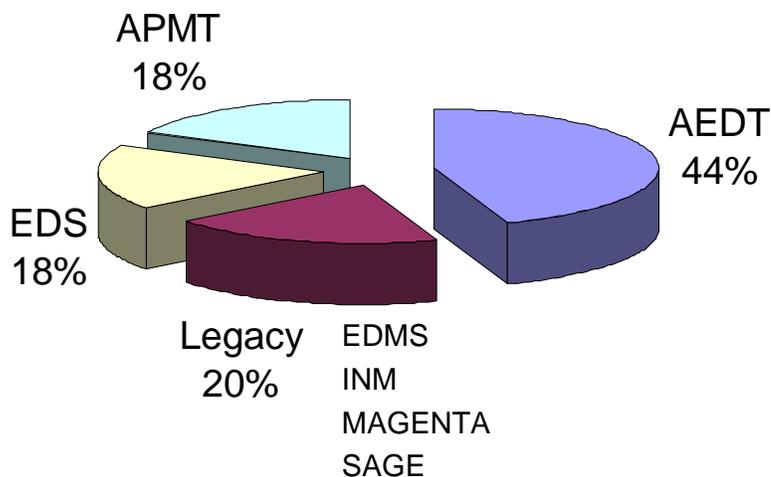


Schedule

•End of •CY	•CAEP •Cycle	•Deliverable
•2004	•End CAEP/6 •Begin CAEP/7 •Work Program	•AEDT Work Plan Completed and Development Effort •Initiated
•2005	↓	•EDS Requirements and Architecture Defined •APMT Requirements and Architecture Defined •AEDT Prototype Demonstration (v 0.0)
•2006		•AEDT Version 1.0 for CAEP/7 Introduction •EDS (v1) and APMT (v1) Capability Demonstration
•2007	•CAEP/7 •Begin CAEP/8 •Work Program	•EDS (v2), AEDT Version 1.1 and •APMT (v2) for CAEP vetting
•2008	↓	•EDS (v3), AEDT Version 1.2, and •APMT (v2) applied for CAEP/8
•2010		•CAEP/8

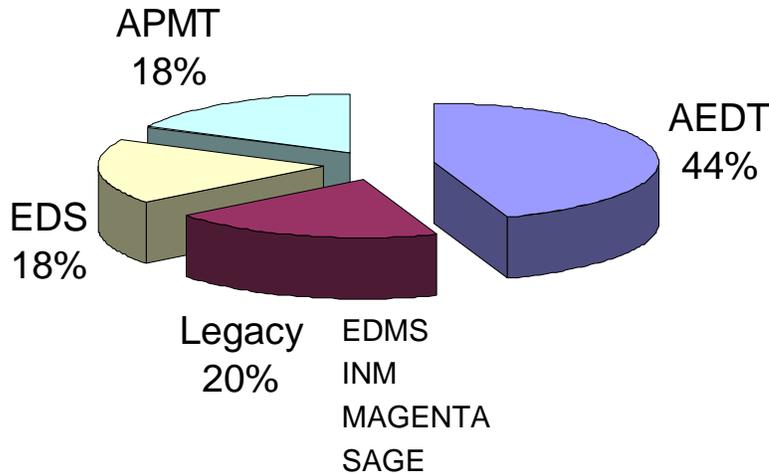


Budget



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\$1000s	FY04	FY05	FY06	FY07-FY10	FY11-FY12	FY13
	500	6,800	9,200	~9,500	~\$8,000	\$4,000



Accomplishments

- **AEDT Version 1.0**
- **EDS Version 1.0**
- **APMT Version 0.0**
- **Evaluating capabilities for analyzing trade-offs between noise and emissions and amongst emissions**
- **Continuing assessment and uncertainty analysis**
- **Upgrades to INM, EDMS, MAGENTA, and SAGE modules for incorporation into AEDT**



Return on Investment (so far)

- More efficient modeling through consolidation of datasets
- Responsive to Vision 100 streamlining of the environmental assessment process
- More reliable information, e.g., fuel burn
- Legacy tools benefit from collaborative work on common algorithms and flight trajectories
- AEDT supporting various activities (e.g., CAEP, JPDO)
- More 'transparent' process in model development may lead to wide 'buy-in' from our stakeholders
- EDS evolving as a platform for round table discussions with manufacturers about technologies



Closing Observations

- Environment is a key constraint on aviation's capacity to grow
 - We must continue to reduce environmental impact of aviation - a multidisciplinary approach is required
 - Decisions (and non-decisions) are made – need best possible analyses and quantitative estimates of uncertainty in a form useful to decision making
- We are uncovering many unknowns/learning many lessons – this is hard!
- Stakes are high (potentially billions of \$s) – we as a community need to get this right – we need your input and participation

