



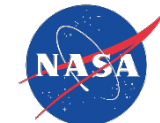
Acoustics Technical Working Group History

Dennis Huff/NASA GRC
April 10, 2018



Early Years

- **Established in 1992 to plan and execute the Advanced Subsonic Technology (AST) Noise Reduction Program.**
- **Vision of Dave Stephens (Langley) and John Groeneweg (Lewis), implemented under the leadership of Bill Willshire.**
- **Initial meetings held every 2-3 months with about 10 people.**
- **Attendance grew as program started in 1994. A Steering Committee (SC) was added to provide industry feedback to NASA senior management.**
- **TWG meetings lasted 2 days, SC meeting held after TWG.**
- **Presentations were made by government and industry representatives with active tasks supporting the program.**
- **Attendance was restricted to U.S. organizations, non-disclosure agreements used to control data dissemination.**
- **University representatives were added when the Quiet Aircraft Technology (QAT) project started in 2000.**



1995

Advanced Subsonic Technology Noise Reduction

INDUSTRY COORDINATION GROUPS

Steering Committee

Allison.....Bettner

Boeing.....Craig

DFW.....Robertson/Linn

Delta.....Bautz

Douglas.....Haight/Joshi

Gulf. Aero..Hilton

GE.....Gliebe

N.O.I.S.E....Price (Retired)

P&W.....Wagner

Ex-Officio:

NASA....Hood

FAA.....Erickson

Technical Working Group

Industry

Allied Signal...Weir

Allison.....Dalton

Boeing.....Cuthbertson

Douglas.....Joshi

GE.....Gliebe

Lockheed...Reddy

P&W.....Mathews

Rohr.....Yu

Sikorsky.....Yoerkie

NASA

Groeneweg

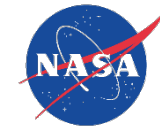
Schmitz

Stephens

Willshire

FAA

Skalecky



Current - 2018

Acoustics Technical Working Group

| | | |
|---|---------------------------------|---------------|
| ATA Engineering | NEAT Consulting | NASA Ames |
| Aurora Flight Sciences | National Institute of Aerospace | NASA Glenn |
| AVEC Inc. | Naval Research Laboratory | NASA Langley |
| Bell-Textron | Northrop Grumman | |
| Boeing | Omega Squared Design, Inc. | Embry Riddle |
| Combustion Research and Flow Technology, Inc. | Optinav, Inc. | Florida State |
| DFW International Airport | Practical Systems & Technology | Old Dominion |
| Dept. of the Navy – NAVAIR | Rolls-Royce | TU Delft |
| Exa | SMD Corporation | Virginia Tech |
| FAA | Techsburg, Inc. | Wichita State |
| GE | Uber | |
| General Atomics Aeronautical Systems, Inc. | United Technologies | |
| GRAS Sound & Vibration | Volpe | |
| Gulfstream | | |
| Hexcel | | |
| HMMH, Inc. | | |
| Honeywell | | |
| Huntington Ingalls Industries | | |
| Joby Aviation | | |
| Josephson Engineering | | |



Workshops

- **In addition to semi-annual meetings, special workshops were held for engine and airframe noise research.**
- **Similar to AIAA meetings (parallel sessions over 2 days).**
- **Opportunity for researchers to present major progress over ~2-3 years in specific areas like fan/jet noise prediction, liners, fan/jet noise reduction, core noise, airframe noise prediction/reduction, and propulsion/airframe aeroacoustics (PAA).**
- **Proceedings disseminated in bounded volumes and CD's to TWG members.**



Typical Agenda

- **Introductions by NASA project team providing information on budget, milestones, and other news.**
- **Feature presentations from TWG members on hot topics like regulation, airport procedures, implementation issues, etc..**
- **Project technical leads present highlight level progress reports and specific significant accomplishments since previous meeting.**
- **Steering Committee report.**
- **Dinner!**
- **Locations alternated between NASA and industry host. Tours were given of government labs, industry facilities and airports.**



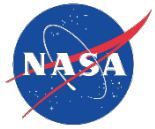
Success Stories

- **Consolidated research across TWG saved time, money and promoted efficient technology transfer:**
 - **Swept/leaned stators for fan noise reduction**
 - **Chevron nozzles for jet noise reduction**
 - **Continuous mold line flaps for airframe noise reduction**
 - **Noise prediction codes**
 - **Active noise control**
 - **Noise source diagnostics experiments**
 - **New measurement methods (phased arrays)**
- **Shared data bases and prediction tools (“SDT” tests and blind prediction exercises).**
- **Cost shared technology maturation demonstrations**
 - **PW4098, CF-34, TFE731, HTF 7000, QTD2**



Going Forward

- **The TWG has endured over changes in programs, projects and organizations.**
- **The Urban Air Mobility (UAM) meeting on Thursday will explore the possibility of utilizing the TWG for yet another important opportunity for noise research.**
- **New organizations will be involved and roles for government, academia and industry will need to be discussed.**
- **In preparation for this meeting, please think about how you would like to see NASA provide this coordination role.**



Backup



Intellectual Property

- **Technical results and data were shared within the TWG.**
- **“Sensitive” data (noise reduction concepts) were shared with TWG typically 2 years before public dissemination.**
- **“Generic” data (validation data bases, noise predictions) were publicly released as soon as reports completed review process.**
- **Non-proprietary geometry definitions released with non-disclosure agreements.**
- **Limited Exclusive Rights Data (LERD) was introduced part way through the AST Program and used until the end of the QAT project in 2005. LERD formalized the process for delayed dissemination of data. The noise programs delayed two years and the propulsion programs (AST, UEET) delayed five years.**
- **Current Acoustics TWG is open to non-U.S. organizations under the Fundamental Aeronautics program. LERD is no longer being used. The only filters being applied to data dissemination are export control laws.**