



Supersonic Vehicles Technology

Sonic Boom Technology Development and Demonstration

FAA Civil Supersonic Aircraft Workshop

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Supersonic Vehicles Technology

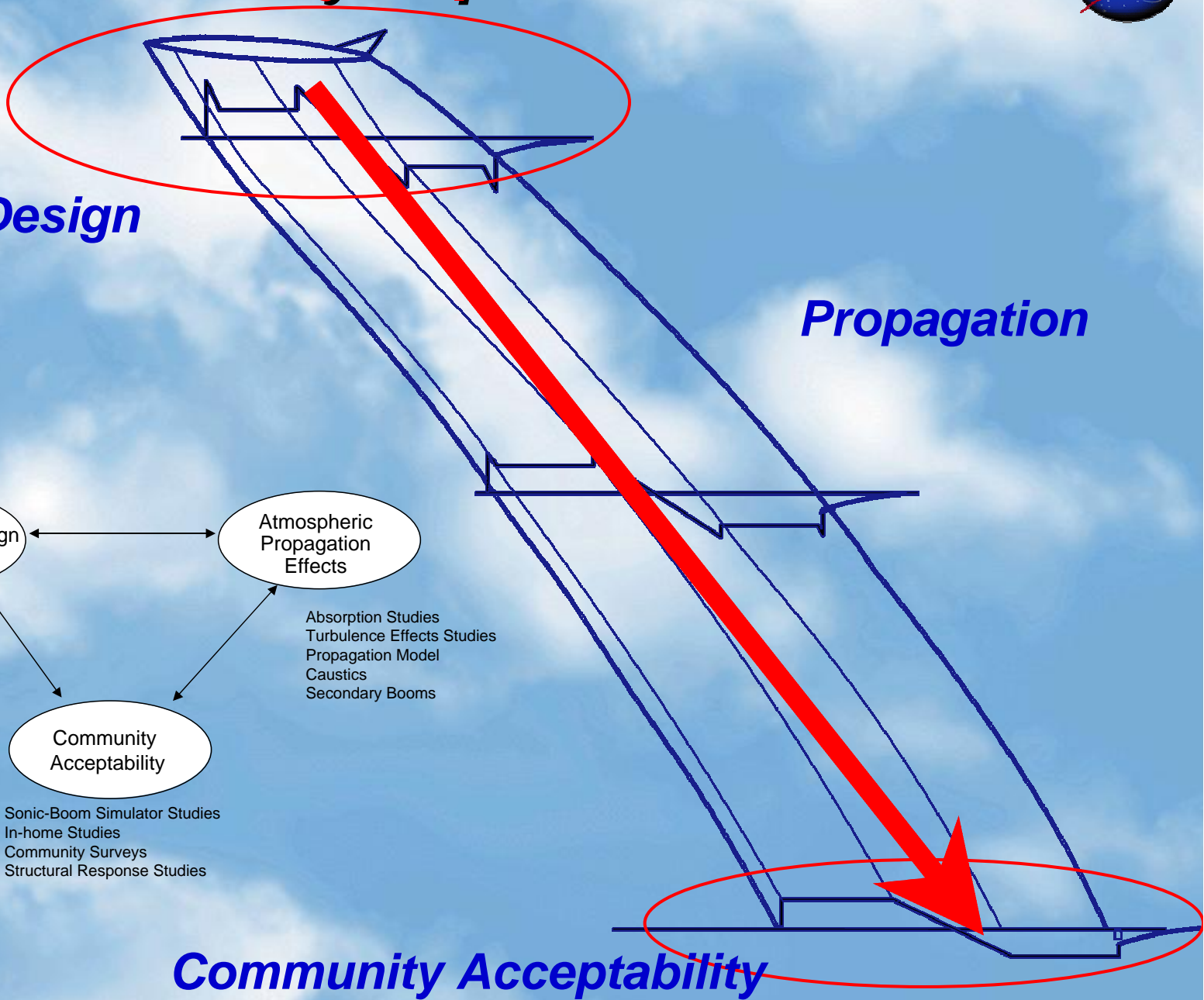


Response to FY 02 Congressional Mandate

Three Element Approach Selected

1. *Leverage DARPA Quiet Supersonic Platform (QSP) technology demonstrations that relate strongly to civil aircraft and fit with NASA core competencies*
 - *Shaped Sonic Boom Flight Experiments*
 - *Supersonic Laminar Flow*
 - *DFRC F-15 FTF tests*
 - *Wind tunnel test of ASU concept in LaRC UPWT*
2. *Develop a solid foundation for a full follow-on program*
 - *Engage Industry Partners in planning process*
 - *Identify technology requirements and sensitivities*
 - *Build working relationships*
3. *Support technology development in critical areas not currently funded*
 - *Sonic Boom and Acoustics*
 - *Aerodynamic Performance*
 - *Propulsion Noise and Performance*
 - *Design Approaches*
 - *Flexible Vehicles*

SVT Addresses Key Topics in Sonic Boom



Vehicle Design

Propagation

Community Acceptability

Configuration Design and Operation

Atmospheric Propagation Effects

Community Acceptability

Concept Designs
Wind Tunnel Tests
CFD Analysis
Systems Studies

Absorption Studies
Turbulence Effects Studies
Propagation Model
Caustics
Secondary Booms

Sonic-Boom Simulator Studies
In-home Studies
Community Surveys
Structural Response Studies

NASA Involvement Crucial to SSBD Success



Wind Tunnel Validation



Near Field Pressure Data Collection



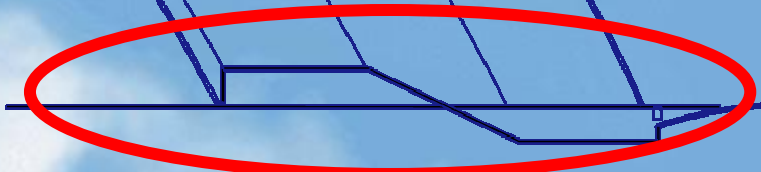
Mid Field Pressure Data Collection

Improved Ground Pressure Measurements

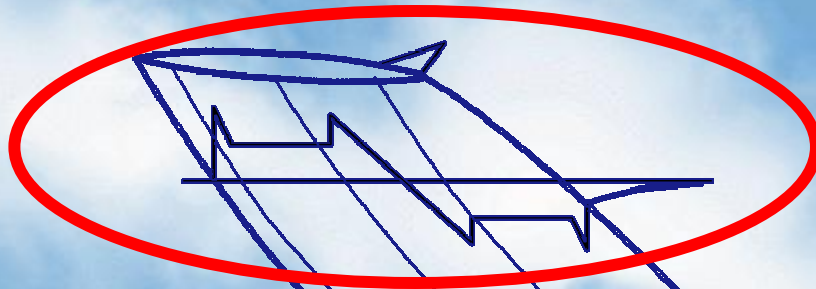


SVT Community Acceptability Efforts

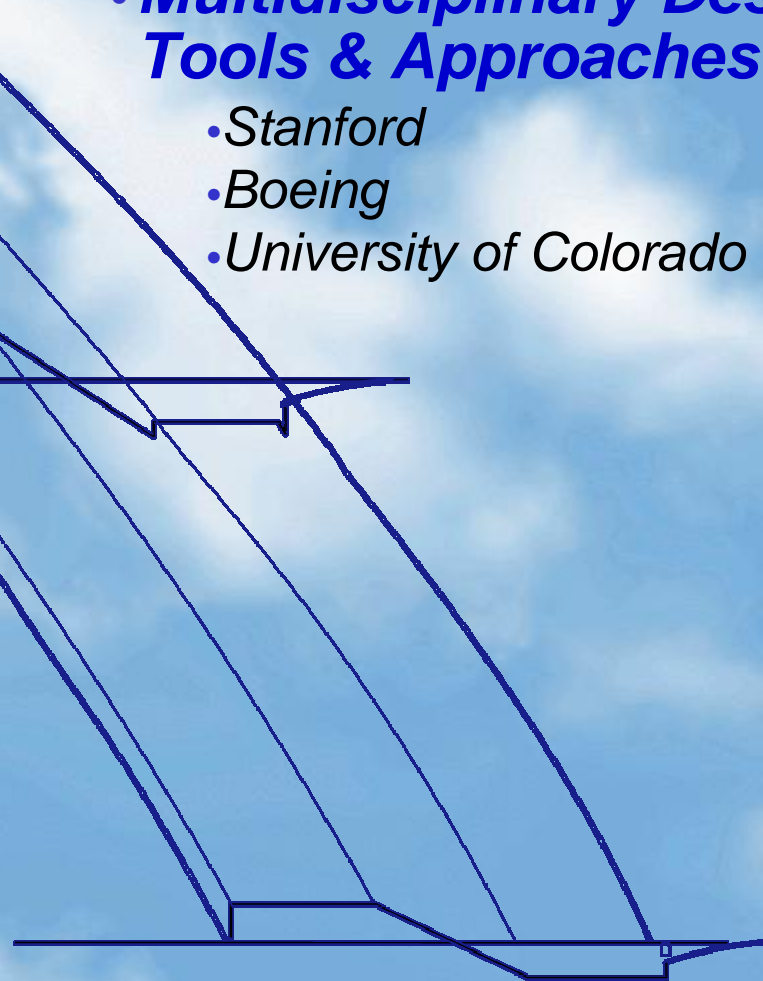
- *LARC “Boom Box” simulator reconditioning completed*
- *Initial Studies of low ΔP shaped booms concluded*



SVT Vehicle Design Efforts



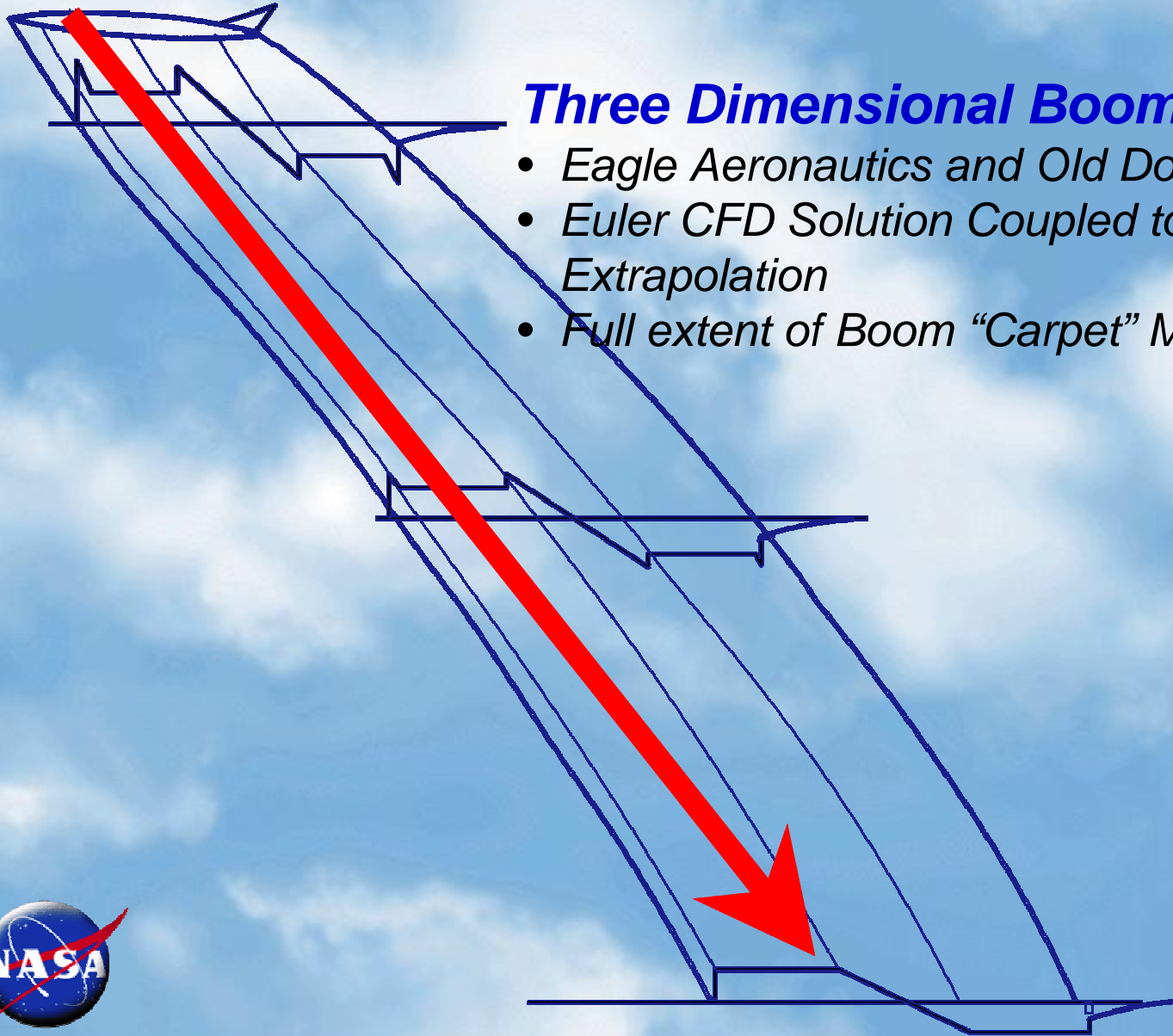
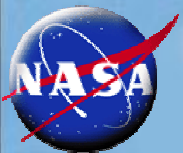
- *Validation Data Experiments*
 - *LaRC*
- *Multidisciplinary Design Tools & Approaches*
 - *Stanford*
 - *Boeing*
 - *University of Colorado*



NASA Propagation Efforts

Three Dimensional Boom Propagation

- *Eagle Aeronautics and Old Dominion University*
- *Euler CFD Solution Coupled to Full Potential Extrapolation*
- *Full extent of Boom "Carpet" Modeled*



Sonic Boom Reduction: Next Steps



FY 04

- **SSBD Follow on Flights**

- Average Ambient Temperature Low Enough to Achieve Design Mach SSBD
- Design Mach Starting in December
- Robustness of Shaped Boom
- Maneuver Effects

FY 02-03 Earmark Activities to Continue in new VSP plan

- **Acceptable Boom Metrics and Levels**

- Boom Simulator Studies explore low initial overpressure signatures

- **Low-Boom Vehicle Design**

- Application of Multi-Disciplinary Design

Future Activity?

- **Shaped LOW Boom Flight Demonstration**

- Overflight of Populated Areas