

Importance of Test Facility Characterization

WTCWG Face-to-Face Meeting 2024

AFRL, Dayton, OH

8/13-15/2024

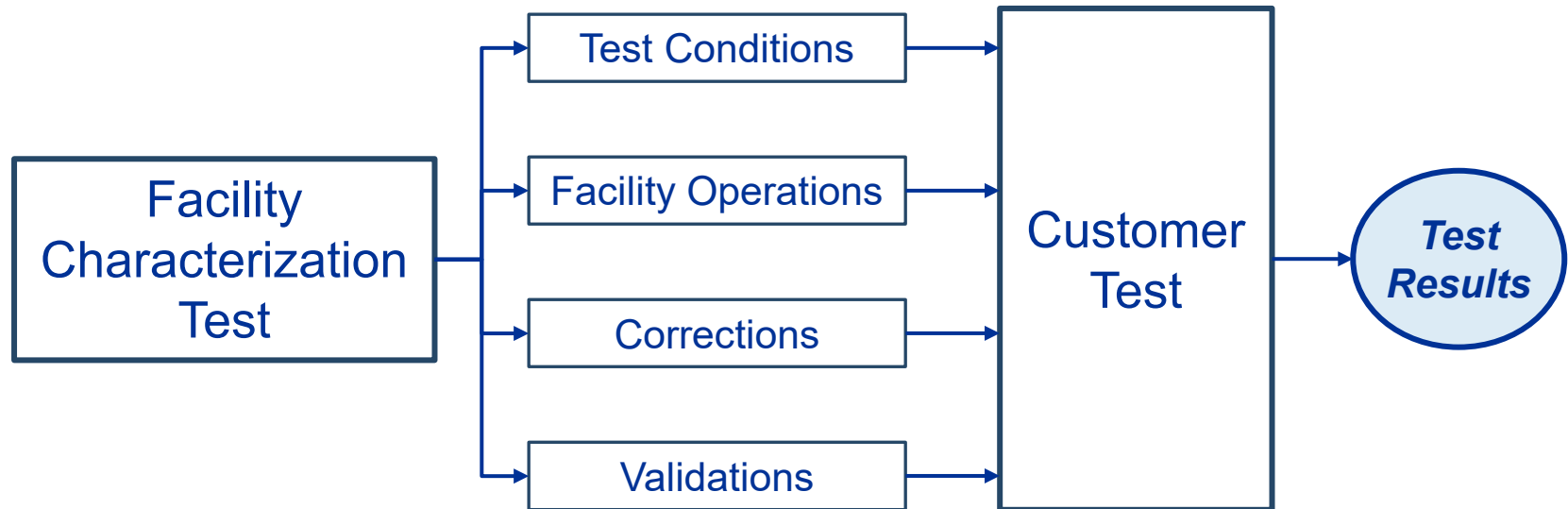
E. Hubbard/FTD

A. Johnson/TFOME

A. Arrington/TFOME

Characterization is Foundational

“The most important test you’ll ever run in your facility is the characterization because it affects every customer test down the line.” - Mike Mills, AEDC Fellow

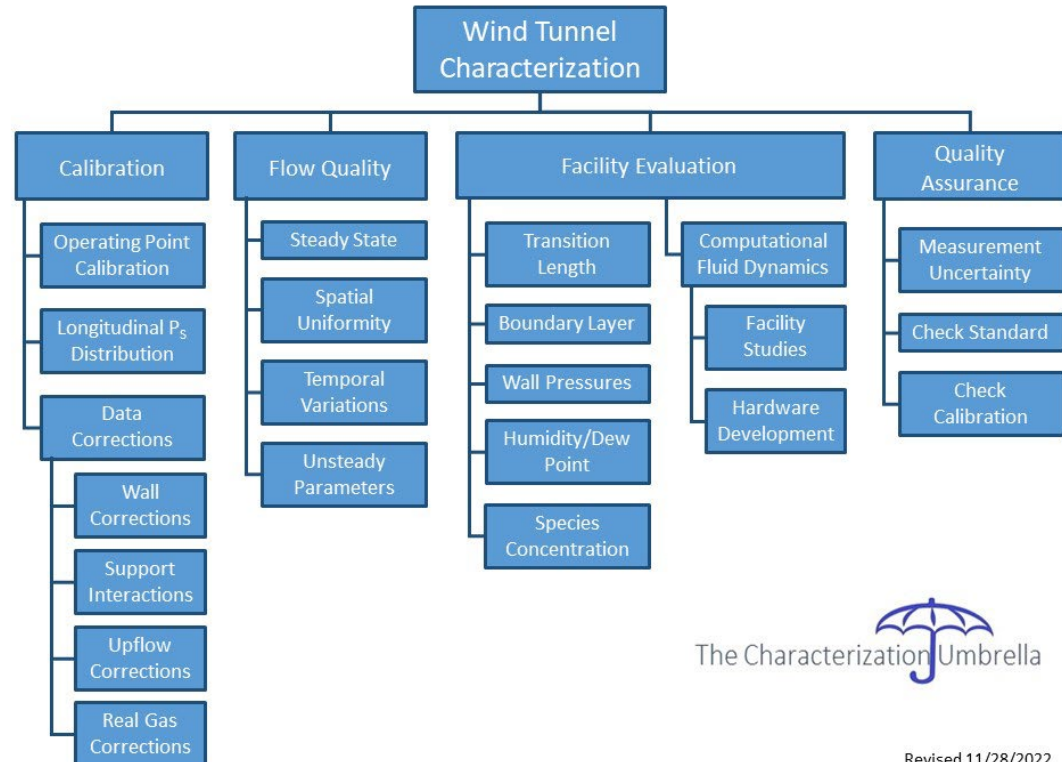


What is Characterization?

Characterize: To describe the distinctive nature or features of something.

Test Facility Characterization:

- The process of investigating, understanding, explaining, and documenting the relevant features of a test facility and its performance.
- Characterization is a multifaceted approach to fully understand a complex test facility.

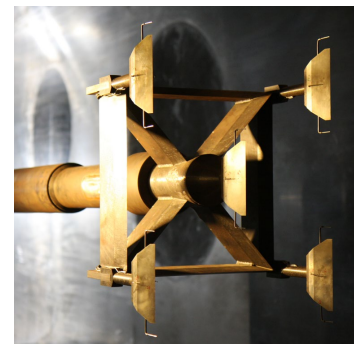


The Characterization Umbrella

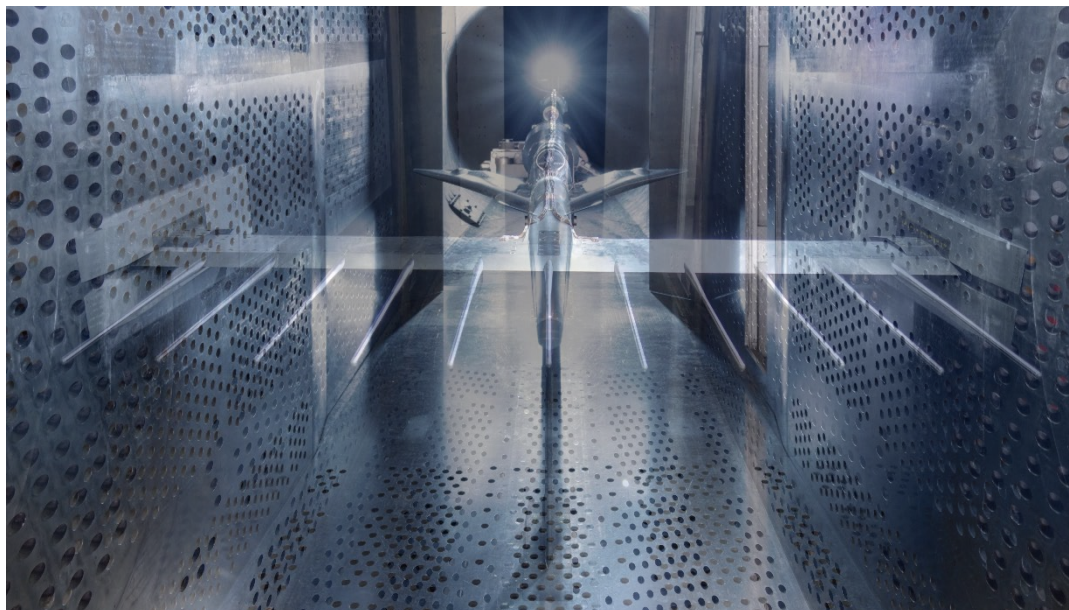
Revised 11/28/2022

Why is Characterization Important?

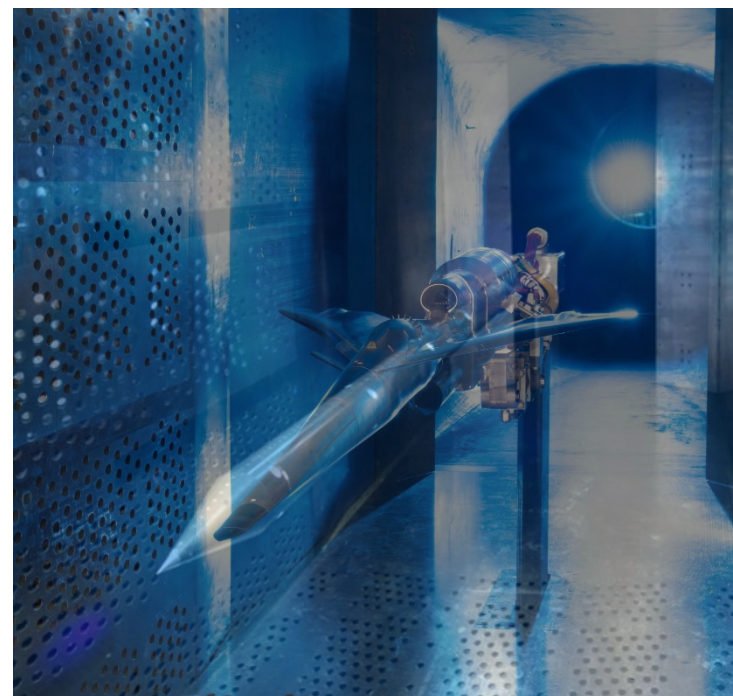
- Ground tests are experimental simulations of flight conditions.
- Understanding a facility's characteristics – through characterization testing – is foundational to acquiring quality ground test data.
- Ground testing = risk reduction.
Risk is further reduced when facilities are well-characterized.
 - Test uncertainty can be optimized by the knowledge gained.
 - Facility features can be distinguished from customer test outcomes.
 - Effectiveness and significance of test results can be readily assessed.



Characterization Provides...



- ...a foundation for
 - ✓ *Confidence.*
 - ✓ *Data Quality.*
 - ✓ *Credibility.*



- ...well-understood facility behavior.
- ...regular feedback on facility performance compared to accurate measurement standards.
- ...statistical defensibility.

➤ ***Customers return to facilities that produce test results they can trust.***

SINGLE SLIDE (ELEVATOR PITCH)

Impact of Characterization Testing

What is it?

Investigating, understanding, and documenting the relevant features and operation of a test facility.

Ground testing is a risk reduction methodology for flight systems development.

Why do it?

Risk is further reduced when facilities are well-characterized.

- Test uncertainty can be optimized by the knowledge gained.
- Facility features can be distinguished from customer test outcomes.
- Effectiveness and significance of test results can be assessed.

We do. It serves as a foundation for data quality and facility performance, providing confidence and credibility.

CFD. Characterization data provide the CFD boundary conditions and uncertainty values required for valid comparisons.

Customers. Their test data quality is directly linked to the quality of the characterization that preceded their test. *Customers return to facilities that produce test results they can trust.*

Who needs it?

“The most important test you’ll ever run in your facility is the characterization because it affects every customer test down the line.”

- Mike Mills, AEDC Fellow

BACKUP CHARTS

Who Needs Characterization Data?

- ***Test Providers***

- Understanding a facility is fundamental to its operation and to ensuring quality test data.
- Well documented facility characterizations assist in understanding whether anomalous occurrences are facility- or test-article-related.
- Characterization data is a great seed data set for uncertainty analysis.

- ***Customers***

- Aerodynamic and propulsion systems are becoming more sensitive to facility characteristics.
- They require well-defined characterization and uncertainty to assess the effectiveness of test designs and significance of their results.

- ***CFD Analysts***

- Characterization data provides boundary conditions for CFD simulations.
- It allows them to better understand tunnel data for extrapolation to flight.