# Standards Laboratory and Traceability

## The Truth Is Out There!

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*PQAO Training 2019*

# Agenda

1. **STANDARDS LABORATORY OVERVIEW**
   - Objective
   - Data Management Life-Cycle
   - Request For Service
   - Selecting The Right Service
   - Improvements
2. **METROLOGICAL TRACEABILITY**
   - Data Integrity
   - 7 Essential Elements

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# Objective

**CERTIFICATION SERVICES**

- Support function to the Primary Quality Assurance Organization (PQAO)
- Compare reference standards to working standards
- Verify measurement accuracy of devices used for performing field calibrations and quality assurance checks

**DATA QUALITY OF MEASUREMENT RESULTS**

- Complete, Relevant, Timely, Valid, Secure, Traceable

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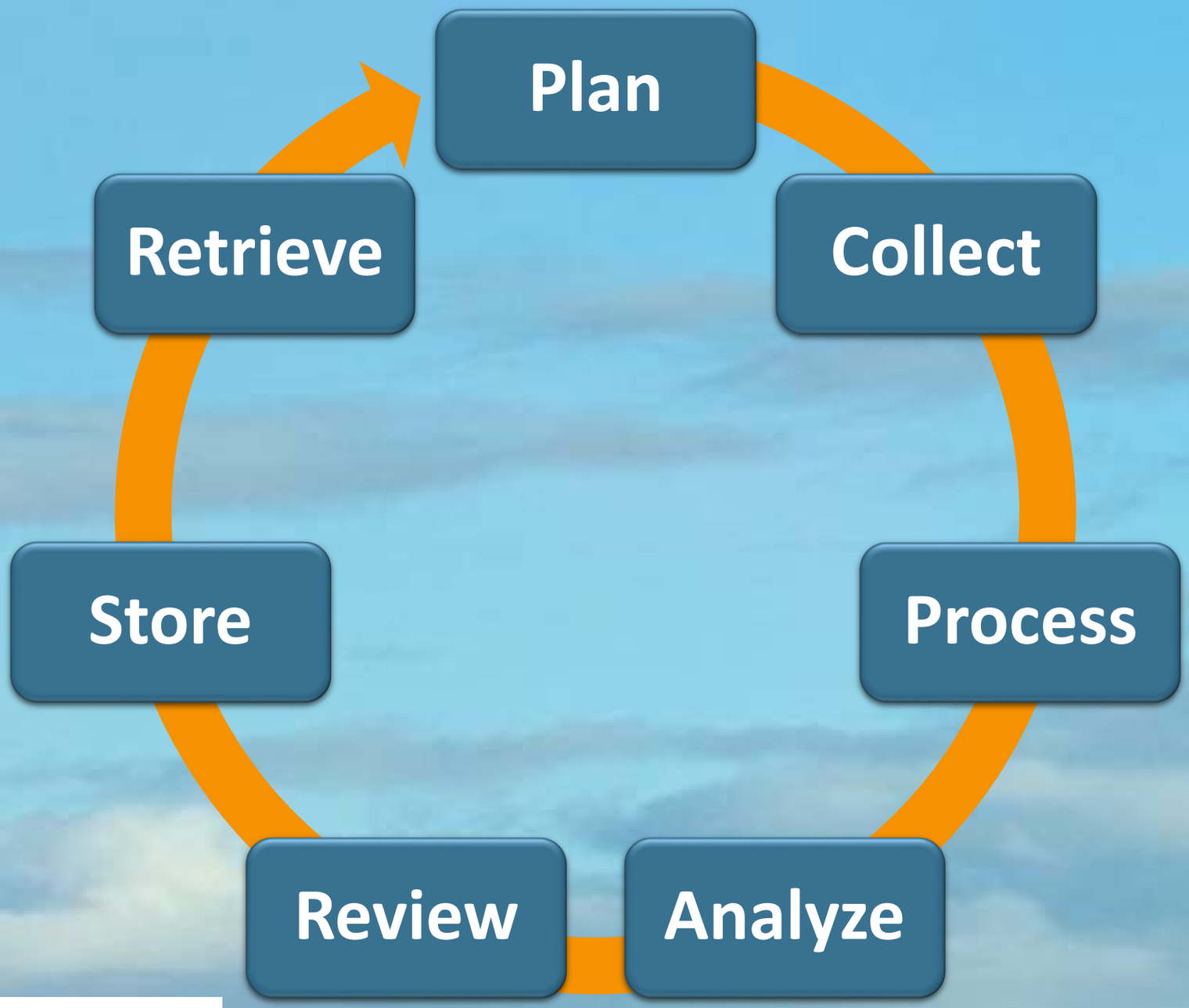
# Data Management Life-Cycle

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# Request For Service

- We Do **NOT** Make Adjustments
  - ➢Compare to Higher Level Standard

- Prior To Bringing In Equipment:
  - ➢Equipment Status (pre and post transport pdf)
  - ➢Ensure In Working Order (replace battery, any warnings on display)

- Before Purchasing Equipment
  - ➢Specify Operating Conditions (temperature (25 °C), communication ports (RS232), etc.)

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# Selecting The Right Service

## Ozone

**Level 2: Bench**

(2% Slope; ±3ppb Intercept; No Correction Equation)

- **Verification**
  - 6 Cycles

**Level 3: Moved to Field**

(5% Slope; ±3ppb Intercept; Correction Equation)

- **Re-Verification**
  - 1 Cycle
- **Verification**
  - 6 Cycles

## Flow: Low Volume

**Fundamental Units**

(2% Slope; 1% Intercept; No Correction Equation)

- **Verification**
  - 1 Cycle

**For Measurement Only**

($R^2$ ≥0.999; Correction Equation)

- **Verification**
  - 1 Cycle

**Make Adjustments in Field**

($R^2$ ≥0.9999; Δ< 1% Slope & Intercept; Correction Equation)

- **Verification**
  - 4 Cycles

## Flow: High Volume

**Actual & Standard Flow**

(<0.007 RSD Slope & Intercept; Correction Equation)

- **Re-Verification**
  - 1 Cycle
- **Verification**
  - 2 Cycles

## Meteorological Equipment

**Pressure**

(<1mmHg)

- **Verification** ($R^2$ ≥0.9999)
  - 1 Cycle; No Equation
- **Verification** ($R^2$ ≥0.999)
  - 1 Cycle; Equation

**Temperature**

($R^2$ ≥0.999; ±0.5 °C)

- **Verification**
  - 1 Cycle

**Relative Humidity**

- **Verification**
  - 1 Cycle
    - **Laboratory** (±2%)
    - **Field** (±5%)

**Anemometer**

- **Verification** ($R^2$ ≥0.999; <2%)
  - 1 Cycle

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# Flow: Low Volume

**Fundamental Units**

(2% Slope; 1% Intercept; No Correction Equation)

- **Verification**
  - 1 Cycle

**For Measurement Only**

($R^2$ ≥0.999; Correction Equation)

- **Verification**
  - 1 Cycle

**Make Adjustments in Field**

($R^2$ ≥0.9999; Δ< 1% Slope & Intercept; Correction Equation)

- **Verification**
  - 4 Cycles

# Improvements

**COMPLETED**

- Quality Assurance Manual
- Training Plan
- Corrective Action Notifications
- 3 Level Review Process + Quality Control Check
- Digital Logbooks
- Standards Laboratory Instrument ID Only (Labels Gone)
- Schedule Your Equipment

# Improvements (Cont.)

**PLANNED**

- Terminology For Services
- No More Hand Entry
- Scan Equipment Upon Arrival and Departure
- New Database System
- Schedule Your Equipment Via Online Calendar
- Standards Laboratory Bulletin/Newsletter
- Ozone Certificates
  - New Look
  - No Zero Adjustment

# Metrological Traceability

Property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty.
(International Vocabulary of Metrology)

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# Data Integrity

**Complete**

- Data Captured Not Filtered

**Relevant**

- To Applicable Requirements & Procedures

**Accessible/Timely**

- Available To Customers When Needed

**Valid**

- Not Fabricated, Entered Correctly, Reproducible

**Secure**

- IT, Records Retention, Protection

**Traceable**

- 7 Essential Elements Of Traceability

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# The 7 Essential Elements of Traceability

1. Understanding of the SI (NIST SP 811)
2. Unbroken Chain of Calibrations (NIST GMP 13)
3. Standard(s) Calibration (NIST GMP 13 and 11)
4. Documented Measurement Uncertainties (NIST SOP 29)
5. Documented/Validated Procedures (GMP 12)
6. Technical Competence (GLP 1)
7. Measurement Assurance (GLP 1)

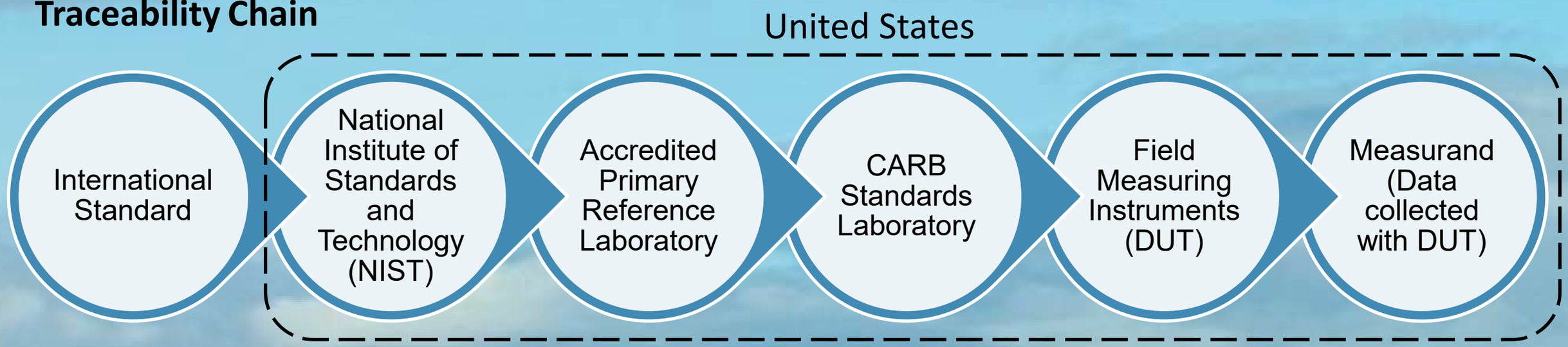
# Metrological Traceability

*Applying the 7 Essential Elements to the Chain of Traceability*

**Essential Elements of Traceability**

1. SI
2. Unbroken Chain
3. Calibration
4. Uncertainties
5. Procedures
6. Competence
7. Measurement Assurance

**Traceability Chain**

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# Questions

Email
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for any follow-up questions.