Fundamentals and LAP Problem Preparation Course

Future Roadmap: "Getting Staff Ready for NIST Seminars"

Series of Self-Study Assignments, Mentoring and On-the-Job Training, Webinars, and Homework Assignments (Blended Learning)

Session Learning Objectives

- IDENTIFY AND DESCRIBE:
  - Expectations for students and mentors for “interim course”
  - New resources (website, forms, and training materials) for On-the-Job Training (OJT) and Mentoring
    - Form for documenting OJT
    - Marked up SOP with Comments – approach for identifying learning objectives
    - Sample forms with learning objectives for SOP 8 Modified Substitution and SOP 19 Volume Transfer
    - Training materials previously shared…..
  - Possible approaches for best preparing new staff

Identifying current staffing needs and solutions

Thank you!

- A coordinated working group to:
  - Identify interim training solutions to obtaining *temporary conditional* Approved Signatory status for new staff; and
  - Consider longer-term improvements for conducting on-the-job training for new staff (Roadmap for staff preparation)
- Thank You:
  - AK – Gary Brown
  - FL – Amy Smith
  - OH – Dan Walker
  - OK – Jeremy Nading
  - OR – Aaron Aydelotte
  - TX – Lisa Corn
  - OWM – Mike Hicks, Val Miller, Isabel Chavez, Mark Ruefenacht, Jose Torres, Georgia Harris
- Be patient! We are all trying to be flexible given current national issues…..

The role of students (*and* new staff)

Student (*New Staff*) Responsibilities

- Take initiative and ask questions!
- Consider it a career and not just a job.
- Complete pre-work/qualify for course (math test) – meets Fundamentals of Metrology requirement
- Complete reading (pre-work and recommendations)
- Complete OJT, self-study, and measurements (student roles)
- Read SOPs and Complete Reading Outlines
- Attend 100 % of the Webinars and Course Assignments
- Be patient – OWM expects that it takes 3 to 5 years to become proficient….

"Fundamentals and LAP Problems Preparation" Course (Blended Learning)

- Prerequisites
  - Math Test, Need SP 811
- Pre-work (same as currently required for Fundamentals of Metrology):
  - NPL Beginner's Guide to Measurement (link is external)
  - NPL Beginner's Guide to Measurement in Mechanical Engineering (link is external)
  - ISO/IEC 17025:2017 "General Requirements for the Competence of Testing and Calibration Laboratories" (staff must demonstrate they have a copy of this standard)
- Mentoring (will cover later)
  - Lab QMS and Admin Procedures
  - SOP 8 and SOP 19

Modules in the "Fundamentals and LAP Problem Preparation" Course

- Four week course, two 4-hour webinars each week, plus additional homework, self-study, mentoring tasks
- Modules (Webinars)
  - Introduction to Course *and* LAP Problems; Calibration Certificates (SOP 1)
  - Traceability and Risk (GMP 11, 13)
  - Measurement Assurance (SOP 30)
  - SOP 8, Modified Substitution
  - SOP 19, Volume Transfer
  - SOP 19, Volume Transfer
  - Basic Uncertainty (SOP 29)
  - Proficiency Testing (GLP 1, PT Follow Up)
  - Calibration Certificates (SOP 1) *and* Wrap Up

NOTE: Detailed learning objectives, homework assignments, OJT are posted with the course on the OWM Events page

Reminder: LAP Problems

1. PT in Mass (SOP 8) and PT in Volume (SOP 19)
2. *Internal Audit:*
    1. Create and evaluate calibration certificates (SOP 1); maybe complete amendments of certificates if needed
    2. Assess Traceability: evaluate supplier calibration certificates, traceability hierarchy, and calibration program and status of equipment and standards
    3. Assess Measurement assurance: evaluate check standards and control charts
    4. Assess Uncertainties: calculate uncertainties and compare with official lab uncertainties
    5. PT Follow Up Form
3. Summary Report – Summarizing all assessments and action items in ONE document (communicating the analysis) and submit to OWM
4. **Outputs from the LAP Problems are INPUTS to Lab Internal Audit and Management Reviews**

Remember: risk, continual improvement…..

The role of mentors in on-the-job training (*and* staff preparations)

Mentoring "Requirements"

- Complete and document training on instructional design and assessment methodologies – it's not just "telling"!
- Conduct OJT on:
  - Lab QMS (ISO/IEC 17025:2017)
  - Lab SAPs (audit process, non conformities, action items)
  - SOP 8 – modified substitution
  - SOP 19 – volume transfer
- Be familiar and supportive of training requirements and LAP problem needs
- Assess reading outlines, perform measurement demonstrations, perform measurement assurance analysis and feedback, observe measurements, identify gaps and provide constructive feedback

Mentor Training Requirements

Training – for Mentor

- Why?
- Ensure consistent use of learning objectives, activities, and assessments
- Provide resources for a skill set beyond “metrology” – *opportunity for professional development*

OJT Tools

- Reading Outline – also used in seminars (dual purpose; save it!)
- SOPs marked up – provide a framework and outline that can be used with ANY SOP
- OJT form – for assessing and documenting objective evidence
- Sample forms
  - SOP 8
  - SOP 19

The laboratory system:
Think about *work flow*
and the lab processes:

- when conducting OJT,
- for risk assessments,
- for continual improvements,
- approach often used in on-site assessments

Documentary Standard: ISO/IEC 17025

"General requirements for the competence of testing and calibration laboratories"

- Contract Review
- Laboratory Calibration and Measurement Capability

Resource Requirements (Staff, Facilities, Equipment, Standards)

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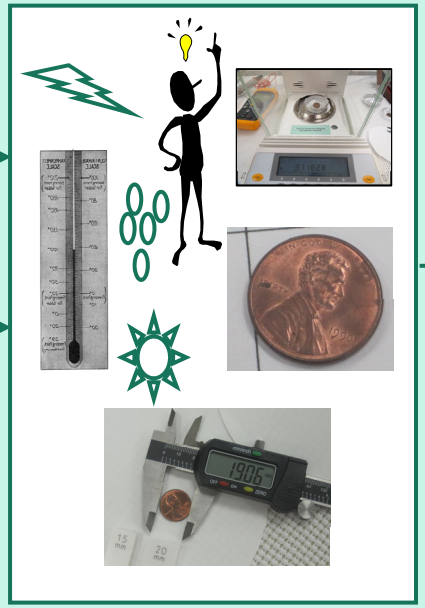

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- Reporting Results

Process Requirements (Care/Handling, Methods, Release …)

Management Requirements (Risk, QMS, Doc/Record Control, Auditing, Actions, Reviews)

Guidance: QMS and Procedures

Objective Evidence: Records

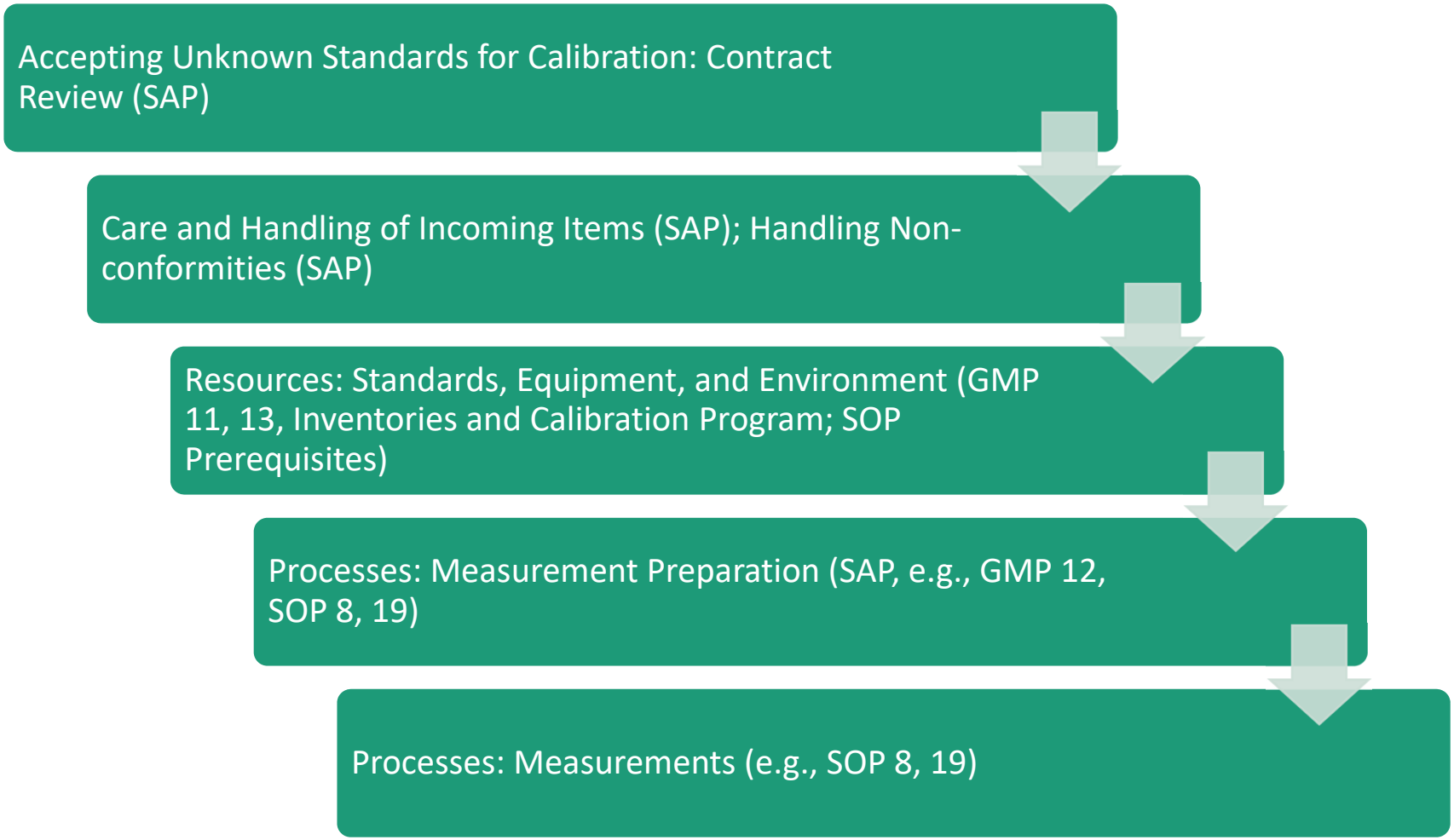
- Safety and Lab QMS (QM and SAPs)
  - Failures often noted when OJT for these items is not completed or documented
- Metrology and Laboratory System (Covered in Fundamentals)
  - GMP 12 – selection of SOPs* (in Mass/Volume)
  - GMP 11 and 13 – calibration program and traceability (care/handling of standards and equipment, and supplier evaluation)
  - SOP 9, 17, 20, 30 – control charts and measurement assurance
  - SOP 29 - uncertainties
  - SOP 1 – calibration certificate (and lab admin procedure and templates)

Guidance: QMS and Procedures

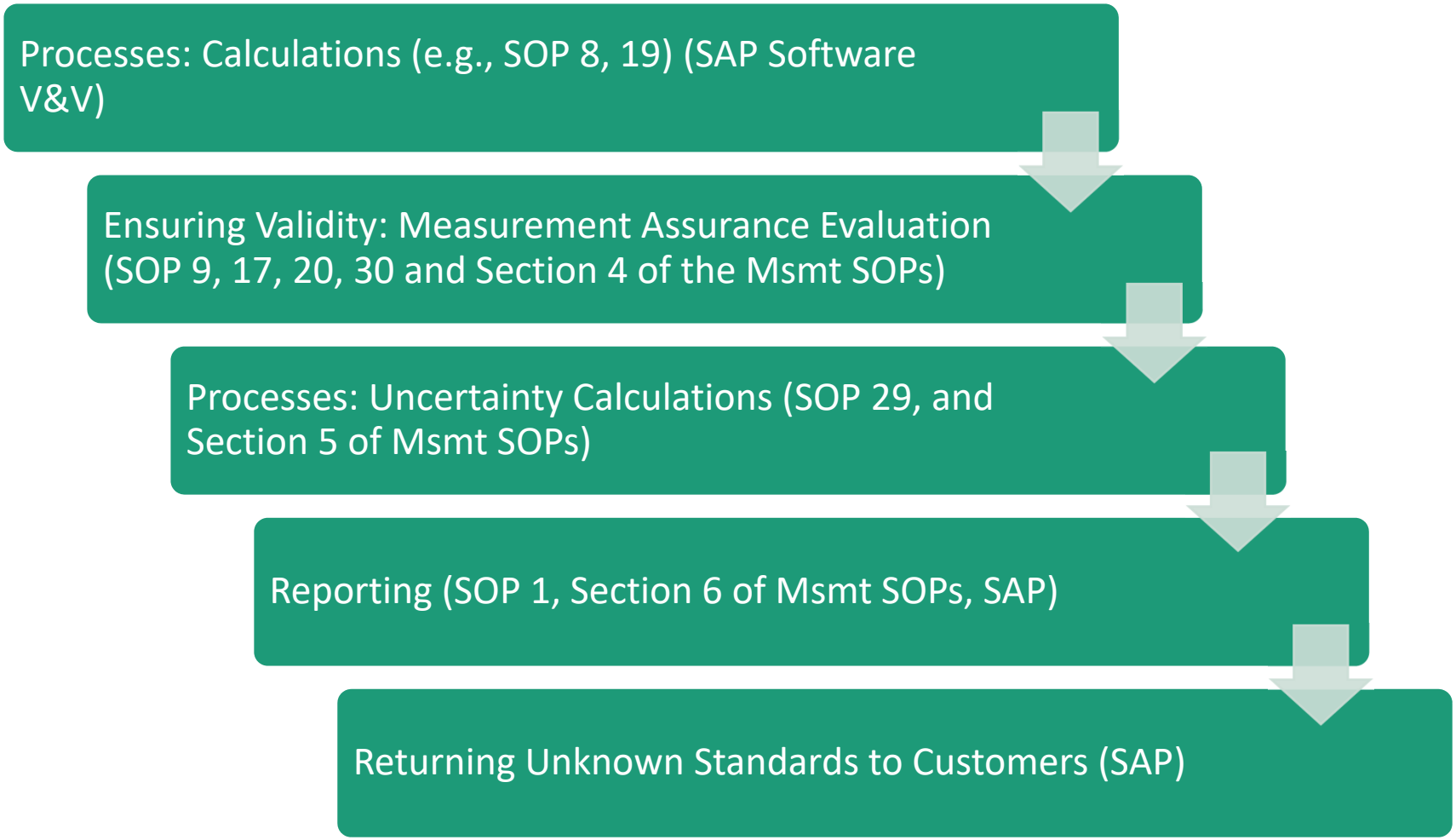
Objective Evidence: Records

- Mass (Covered in Mass) – plus the above
  - SOP 8 – modified substitution
  - SOP 2 – conventional mass and MABC and calculation of air density (and MABC for uncertainties)
  - GMP 10 – good weighing practices
- Volume (Covered in Volume) – plus the above
  - SOP 19 – volume transfer
  - SOP 31 – neck calibration
  - GMP 3 – meniscus reading
  - GLP 10 – water quality and calculations of water density
- Covered in Mass/Volume: Handbooks 105-3, 105-1 (1990), 105-1 (2019), ASTM E-617-18, OIML R111

Checklist of OJT/Mentoring an SOP - I



Checklist of OJT/Mentoring an SOP - II



Overall Goal?

- Taking staff from “new” hire status to being a productive member of the laboratory; a metrologist with ability to sign calibration certificates and ensure that measurement results are accurate and traceable and compliant with ISO/IEC 17025:2017 and the laboratory quality system…..
- Consistently in all labs….
- Training, on-the-job training, LAP problem completion and assessment (including PTs), and approvals

OJT and Mentoring Resources

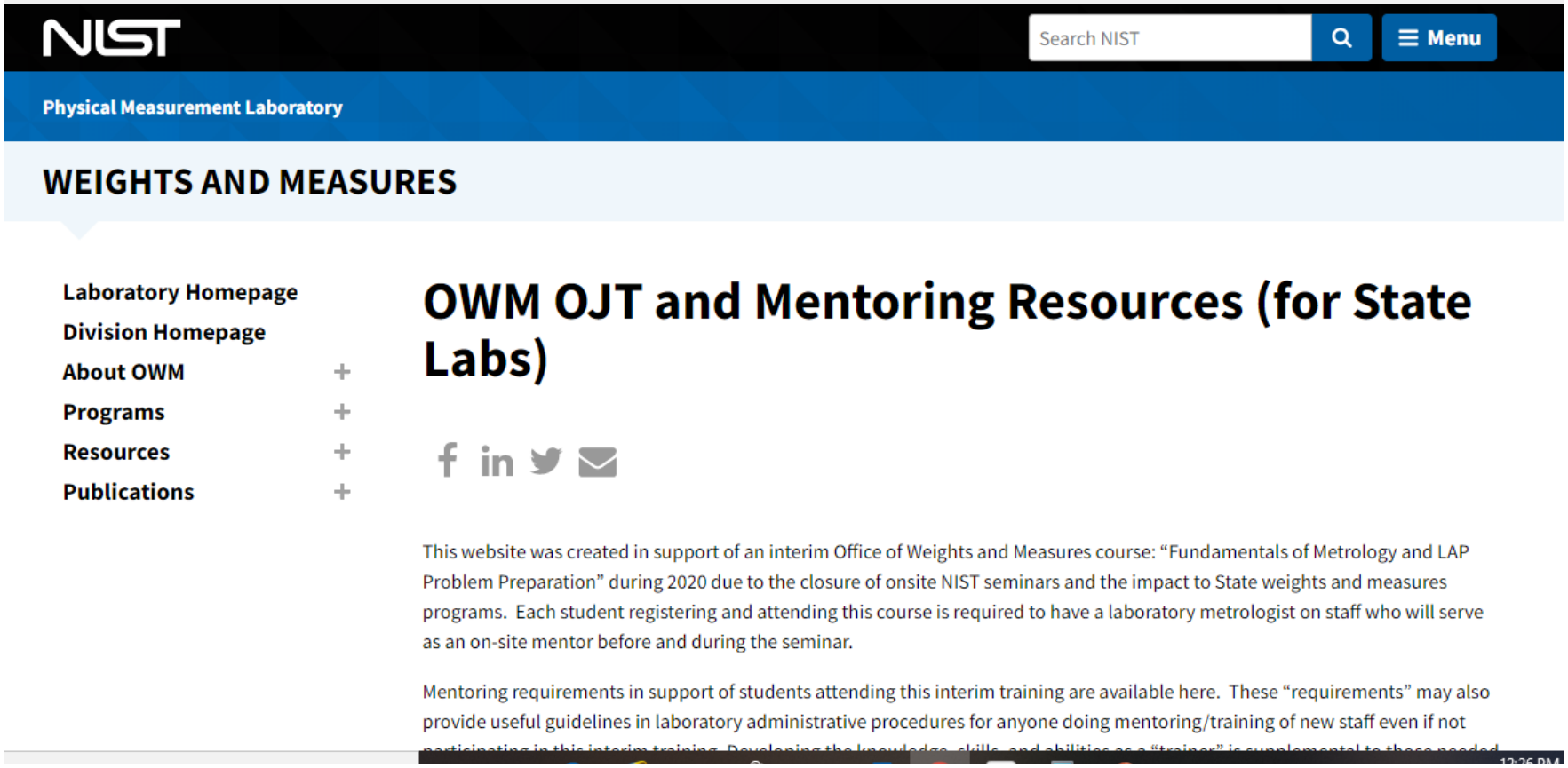
OWM Website

Thank you!

- A number of State laboratories have participated in sharing on-the-job training resources during the 2016 RMAPs, during a 2017 Lab Metrology Info Hour, and during the 2020 working group sessions for developing the Fundamentals and LAP Problem Preparation Course.
- Thank you!
  - AK – Gary Brown
  - CA – Tony Gruneisen
  - FL – Amy Smith
  - KS – Keith Arkenberg, Kevin Uphoff
  - MN – Benj FitzPatrick
  - NC – Robert Rogers
  - PA – Jim Gownley
  - TX – Lisa Corn

Website

https://www.nist.gov/pml/weights-and-measures/owm-ojt-and-mentoring-resources-state-labs



What questions or comments do you have?