



PTB project “Metrology for Digital Transformation - International Cooperation”

CABUREK Global PROGRAM

WORKING GROUP

WG2 - DIGITAL CALIBRATION CERTIFICATE

NATIONAL PROJECT TITLE

Digitization of information using XML files (DCC SCHEME) – Mass Laboratory
(1 mg to 50 kg Weights and Comparators)

National Metrology Institute: INACAL Peru

COACH

(CENAM-MEXICO)

DIGITAL TRANSFORMATION AT INACAL

Digital transformation in metrology enables the automation, efficiency, and traceability of calibration processes. Through the DCC/XML scheme, information becomes interoperable, reusable, and reliable for metrological control and industry.



TRADITIONAL
METROLOGY

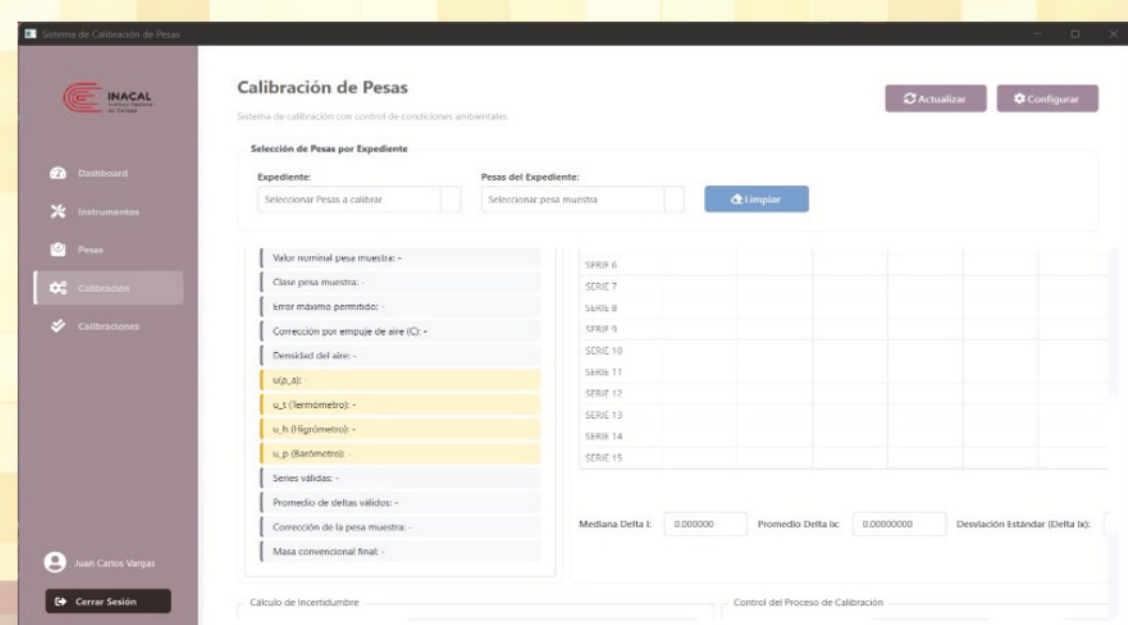


DIGITALIZATION



PROCESS
OPTIMIZATION

PROJECT DESCRIPTION



PyQt6, Python 3.11, SQLite3, Matplotlib, SciPy, PySerial, OpenPyXL, PyDCC, ReportLab.

Real-time data acquisition.

Management of auxiliary instruments, reference weights, and weights under calibration.

Automation of calibration process.

Statistical analysis, calculation of corrections, and estimation of uncertainty.

Results reporting in PDF and XML format.

Phase 1: Automation of the calibration process for weights from 1 mg to 50 kg



Automatic generation of calibration certificates in XML/DCC format, ensuring the digitalization and standardization of measurement information. Focused on the Measurement Results section.

Phase 2: Generation of the Digital Calibration Certificate (DCC) in XML format



Developed with wxPython, Python 3.11, SQLite, OpenPyXL, and Pandas. Software designed to read XML certificates and automate statistical processes, such as comparator characterization and drift analysis of reference weights. Processes that used to take hours are now completed in seconds.

Phase 3: Optimization of metrological assurance processes based on DCC reading

RESULTS AND BENEFITS

- Time reduction: processes that took hours → now completed in seconds.
- Automation of metrological assurance processes: optimization of statistical analysis for comparator characterization and weight drift analysis.
- Digital certificates (XML/DCC): enable interoperability across our systems.
- Regional positioning: leadership in digital metrology transformation.

The project strengthens the country's competitiveness, improves the quality of calibration services, and positions INACAL at the regional forefront of digital transformation in metrology.