

# Automated Preparation of Calibration Standards to SANTE Requirements

T. Breski<sup>a</sup>, H.-J. Huebschmann<sup>b</sup>,

<sup>a</sup>Axel Semrau GmbH, Sprockhövel, Germany,

<sup>b</sup>CTC Analytics Pte. Ltd, Singapore



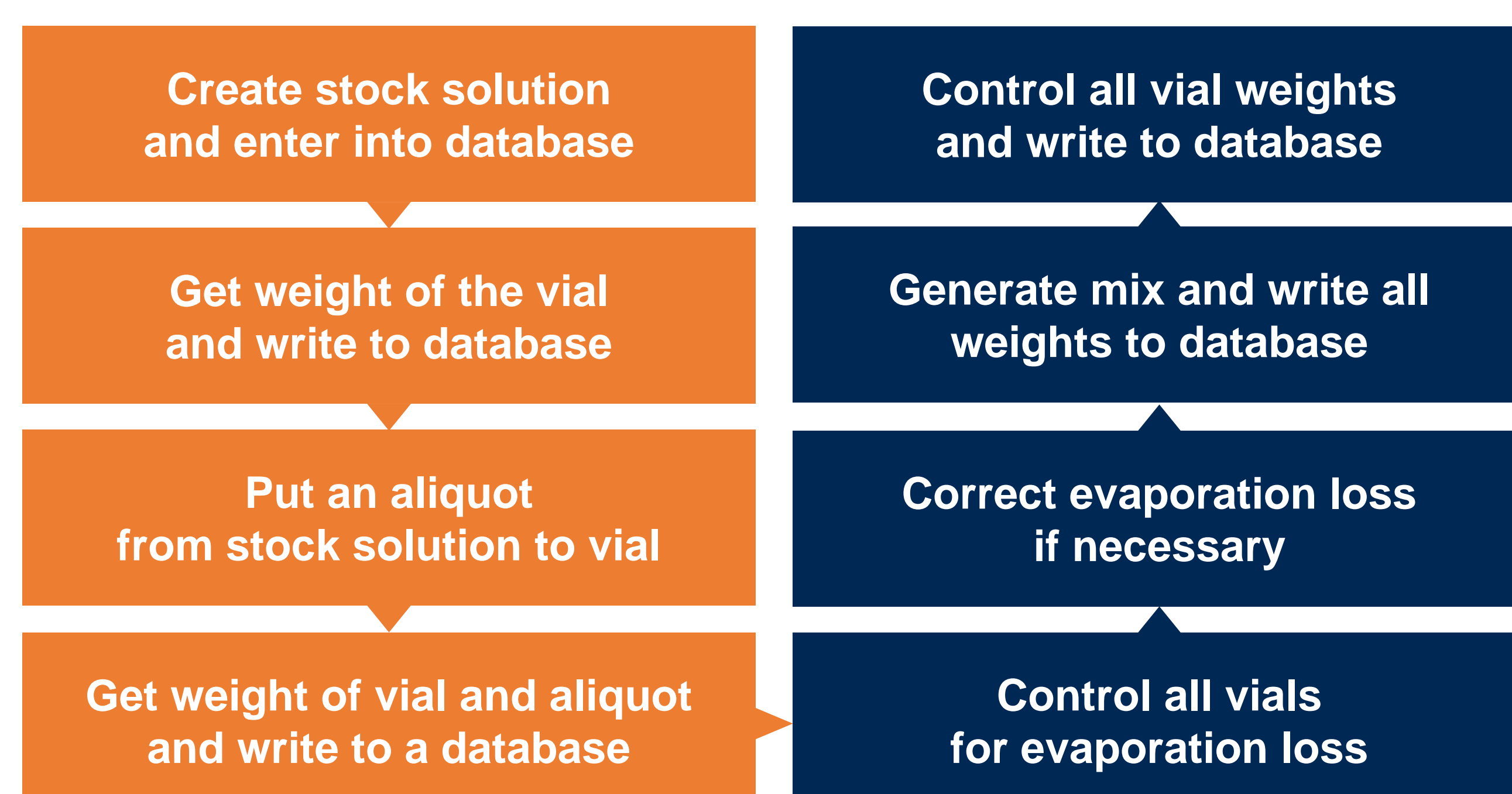
## Problem Statement

- The preparation of working standards for calibration in analytical laboratories is a recurring, labor-intensive task.
- Manual liquid handling steps are often error prone and subject to individual variation.
- The SANTE analytical quality control document sets the requirements for the preparation of calibration standards:
  - Reference substances and stock solutions should be stored in a cool place, e. g. in a freezer, away from light and moisture.
  - Standards should be remixed after equilibration to room temperature.
  - Punctured septa should be replaced as soon as possible.
  - Standard vials should be permanently labelled.
  - The documentation should ensure full traceability of all steps.
  - Date of preparation, identity, mass and volume of the reference standard and the identity and volume of the solvents must be recorded.

## Conclusion

- The MultiMix workstation fulfils the SANTE criteria according to 12682/2019.
- Multi-compound stock solutions from reference materials and dilutions for daily calibrations can be prepared automatically.
- The automated workflow improves reproducibility and accuracy.
- Personal errors are reduced
- Unattended operation leads to significant time savings.
- The described CHRONECT Multimix dilution setup and workflow can also be applied to other analyte groups beyond pesticides.

## Workflow



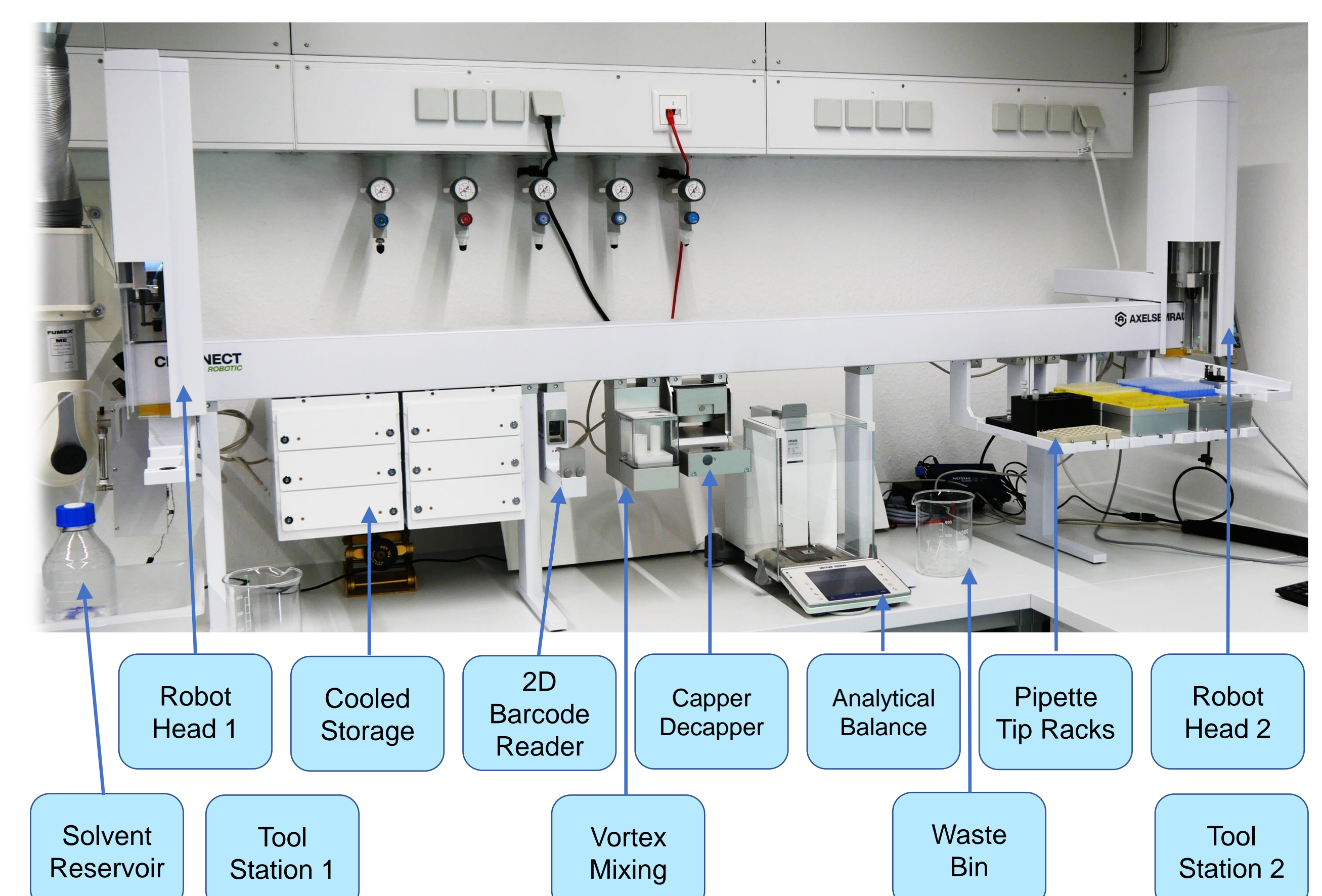
## Special Features

- ◆ Checking weight loss of all standards. ◆ Tracking of expiry dates. ◆ Pipetting prevents carryover. ◆ Liquid/solvent class volume correction. ◆ All dosing steps gravimetrically monitored.
- ◆ Correct evaporation loss. ◆ Weight results transferred to database. ◆ Printing of solvent resistant barcode labels.
- ◆ Compatible with different vials sizes. ◆ Software package based on SQL database with database of > 600 pesticides, concentration table export to data systems.
- ◆ Prepared for Restek direct transfer of standards certificate data using QR codes.

## System Configuration

The Multimix Station is based on a dual head x,y,z-robotic system of 200 cm bar length. Both heads work simultaneously, taking the required tools from two dedicated tool change stations.

Reference and standard vials are placed in a cooled storage. All vials are barcode labeled and registered by a rotating 2D code reader. Vials are gravimetrically controlled before and after liquid handling. No septa are pierced. Vials get decapped before and after use. Pipette tips of different volumes are kept in dedicated trays. A tray for temporary Vortex mixing is provided.



## Time Savings

Prepare a calibration mix of 450 pesticides:  
Manual pipetting and documentation: 32 h, 4 working days!  
Automated workflow: 5 min planning, 20 h unattended process