Georgette Macdonald, B.A.Sc., Civil Eng. & MBA

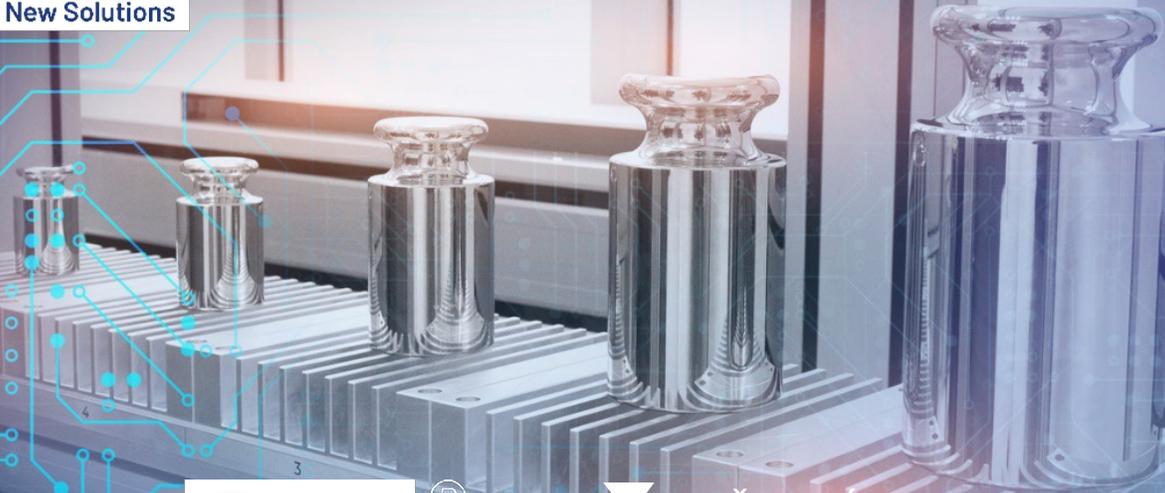**Director General of National Research Council of Canada, Metrology Research Centre**

Georgette Macdonald is the Director General of the NRC's Metrology Research Centre – Canada's National Metrology Institute. Georgette's technical background is in the measurement of mass and related quantities. During her tenure at the NRC, she previously served as Director, Research and Development for Quality Infrastructure at the Metrology Research Centre, and as a Calibration Laboratory Assessment Service (CLAS) technical advisor. In March 2023, Georgette became one of 18 elected members of the International Committee for Weights and Measures (CIPM). She recently assumed the position of President of the CIPM's Consultative Committee on Mass. Georgette is also member of the Board of Directors of NCSL International since 2013, and is currently serving as President.

Skyline of Toronto, Canada

METROLOGY SYMPOSIUM
DIGITALIZATION AND AUTOMATION IN MASS METROLOGY
Third Edition: Future and New Solutions

16-18.04.2024, Radom, Poland

RADWAG

ČESKÝ METROLOGICKÝ INSTITUT

- Introduction to the NRC and NRC Metrology

- Digitalization at the NRC

- NRC mass metrology

- Digitalization phases in mass metrology

NRC: By the numbers

NRC Metrology

Halifax, NS

IRAP offices (yellow triangle)

NRC facilities (red square)

NRC Metrology
Total staff = 200

- Over 5,200 employees and visitors
- Scientific divisions with 13 research centres

Ottawa, ON

About NRC Metrology

Vision: Build confidence in innovation and trade through accurate measurement.

Mission: Provide high-accuracy measurement standards, services and solutions that help transform ideas into market-ready technologies and that inform evidence-based policy, regulation and standards development.

1 **Data governance:** to ensure that data is managed holistically at the right executive and operational levels and as a strategic asset

2 **Program & Policy:** to facilitate the standardized collection, curation, sharing and use of structured and unstructured data across the organization, including research, by establishing the NRC Data Program and developing data policies

3 **Digital Infrastructure & Interoperability:** to develop and employ a more mature enterprise data architecture in order to increase interoperability, repeatability and collaboration between NRC's internal and external collaborators

4 **People and Culture:** to strengthen data literacy across the Council by investing in the development of data skills and competencies
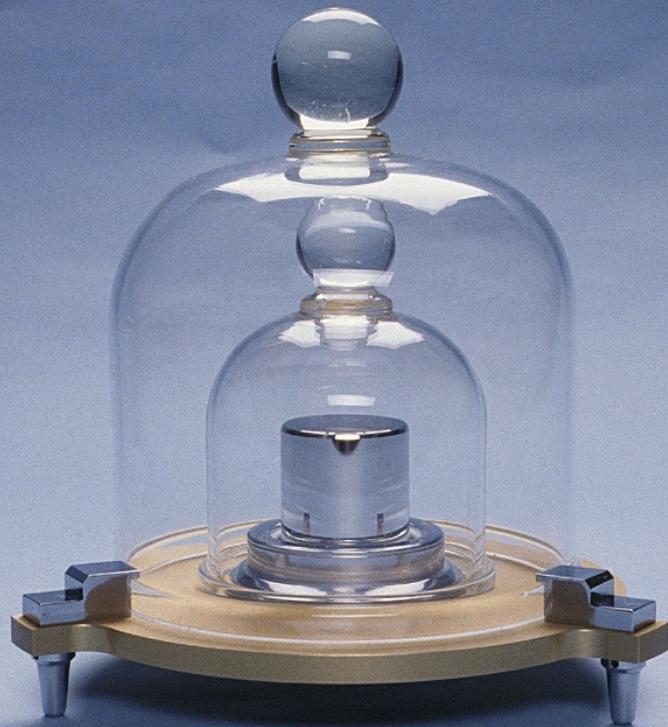
Key Capabilities:

- o Realize the kg, and maintenance of the Canadian mass scale, 1 mg to 60 kg
- o Realize the Pa, scale to 100 MPa
- o Vibration and accelerometers, ultrasound power, laboratory and working standard microphones

Disseminate to: (1) Internal services and research; (2) legal metrology; (3) NMIs; (4) other government departments; (5) industry; (6) workplace health and safety; and (7) product development.

- Use in-house developed software to handle a significant portion of our mass data.

- The software takes the raw data from our balances, along with various sources of environmental data and uncertainties, and automatically completed the analysis

METROLOGY SYMPOSIUM
DIGITALIZATION AND AUTOMATION IN MASS METROLOGY
Third Edition: Future and New Solutions

- Currently working on the first phase of our digitalization plan.

- Phase 1 focuses on converting the existing data streams from their human readable formats to machine readable formats.

- The goal is to create a central database to hold all raw and processed results from the automated balances in our mass laboratory.
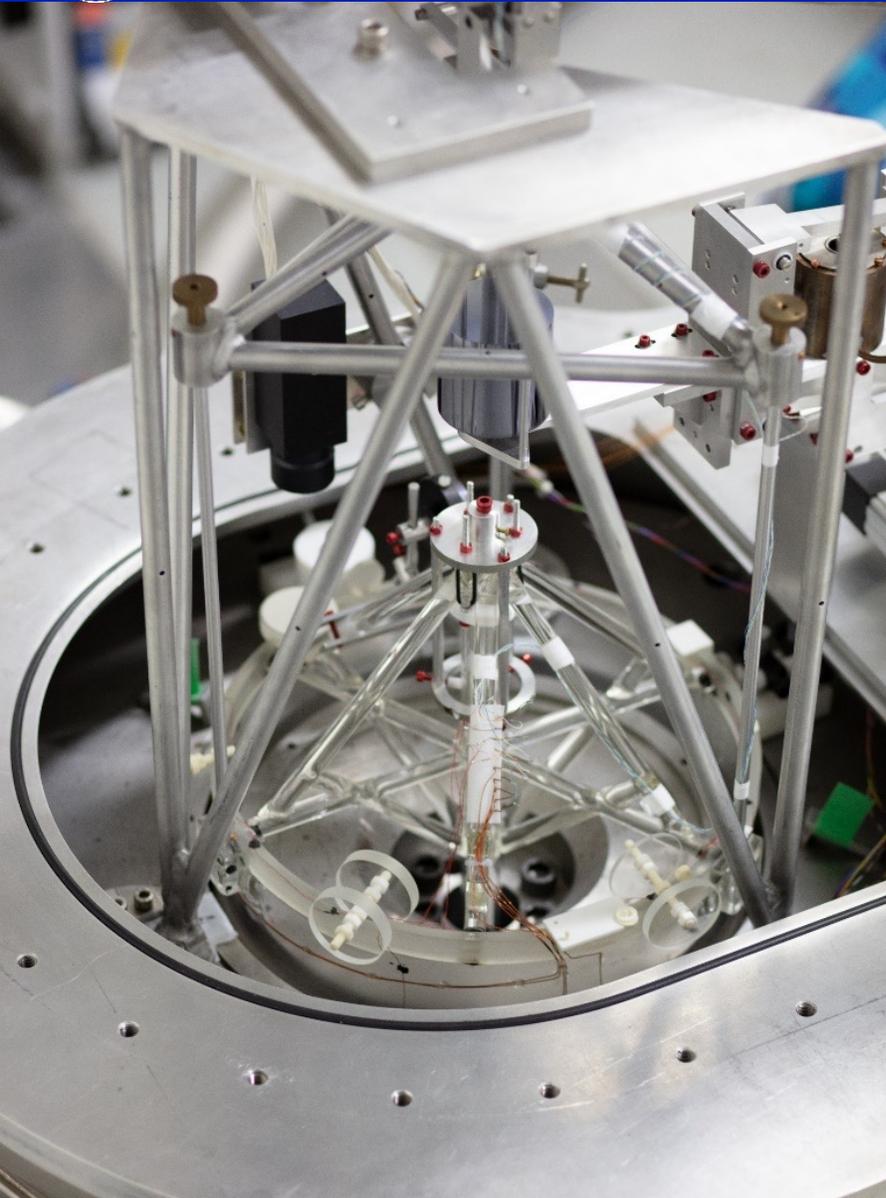
- The creation of digital twins of all client masses.

- The digital twins will be linked to the database and will have full calibration records of the masses.

- Using the information stored in the digital twin of the client masses, develop a digital calibration certificate.

- Automate process that translates the digital calibration certificate into a human readable report for clients.

- Leverage the work from the second phase to create digital twins of all the masses in the Canadian Mass Scale.

- Additional features of the Canadian Mass Scale would include:

  - Drift modeling,
  - Long-term stability analysis
  - Automated process control

- Investigate methods in which we can digitalize and automate the collection and processing of manual mass calibration work.
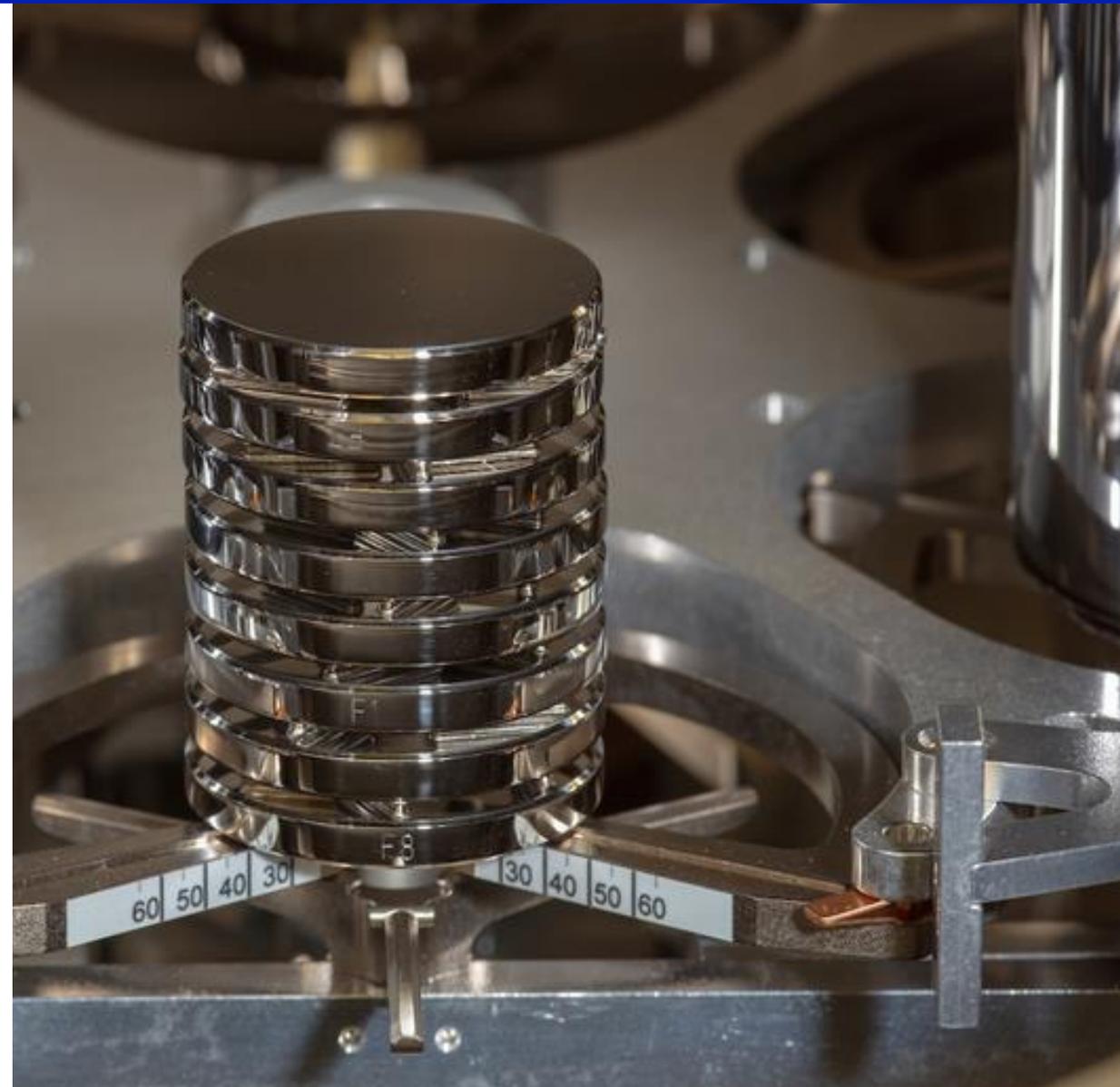
The digitalization work in the mass laboratory aligns well with set goals at both at the Metrology Research Centre and the international level.

Expected outcomes
- reduce the operator time required for each mass calibration
- improve the timeliness and value of results for our clients
- unlock the potential for research projects that leverage the newly accessible data.

Thank you for your attention

www.**radwag**.com