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Report from the CIPM Forum on Metrology and Digitalization (FORUM-MD)

Dr. Patrick Rourke (CCT digitalization representative)

CCT plenary meeting, BIPM, 21-22 May 2026

Structure of FORUM-MD

FORUM-MD follows the rules of a CC: advises CIPM on digital transformation

- Chair: Cornelia Denz (PTB)
- Vice-Chairs: Héctor Laiz (INTI) & Georgette Macdonald (NRC)
- Executive Secretary: Gianna Panfilo (BIPM)
- Membership has grown: NPLI, CENAM, CMI, DFM, METAS, INMETRO, INTI, KRISS, MSL, NIM, NIMT, NIST, NMIA, NPL, NRC, PTB, RCAM-Rostest
- Guests: digitalization representatives from the CCs

Structure of FORUM-MD

FORUM-MD Working Groups & Task Groups

- **TG-AI:** Task Group on Task Group on Building Safe and Trustworthy AI – Chair: Martin Koval (CMI)
- **TG-DQ&FPM:** Task Group on Data Quality and FAIR Practices in Metrology – Co-Chairs: Paul Duncan (NPL) & Daniel Hutzschenreuter (PTB)
- **TG-H-DCC/DRMC:** Task Group on Harmonizing DCC and DRMC – Chair: Narin Chanthawong (NIMT)
  → member: Raúl Caballero Santos (CEM, CCT-WG-Dig)
- **TG-MS:** Task Group on Metrological Semantics – Chair: Anjali Sharma (NPLI)
- **TG-SIDF:** Task Group on SI-digital Framework – Chair: Anna Cypionka (BIPM)
- ***new* TG-SN:** Task Group on Sensor Networks – Co-Chairs: Shan Cui (NMC A*STAR) & Wan-Ho Cho (KRISS)
  → member: Shahin Tabandeh (VTT MIKES, CCT-WG-Dig)
- **WG-CC:** Working Group on coordination between Consultative Committees – Chair: Peter Blattner (METAS)
  → member: Patrick Rourke (NRC, CCT-WG-Dig)
- **WG-RMO:** Working Group on coordination between Regional Metrology Organizations – Chair: Louise Wright (NPL)
- **WG-S:** Working Group on Strategy – Chair: Cornelia Denz (PTB)

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OUTLINE

- Workshop and plenary meeting February 2025
- Workshop and plenary meeting March 2026
- Humidity quantities in SI Digital Framework
- Draft CGPM resolution

WORKSHOP AND PLENARY MEETING FEBRUARY 2025

FORUM-MD workshop – February 2025
“Emerging Topics of Digitalization in Metrology”

- Blair Hall (MSL): Traceability enables reliable decision making
- Shahin Tabandeh (VTT MIKES, CCT-WG-Dig): EURAMET Sensor Network Metrology project (FunSNM) – data quality metrics & lifecycle phases
- Panel discussion:
  - Metrology is way out in front of industry on digitalization, but risks becoming untethered from actual industry needs
  - Easier to teach metrologists data science than teach data scientists metrology

Plenary meeting of FORUM-MD – February 2025

- Report from FORUM-MD Workshop on Complex Sensor Networks
  - Various methods of calibrating sensor networks
  - “Self-calibration” vs. “co-calibration” vs. “in-situ calibration” ⇒ need consistent definition & terms
  - How to address recognition & quality assurance? Use current CIPM MRA or something else?
- Report from IMEKO Workshop on Traceability
  - Traceable measurements = staged series of measuring processes, each adequately documented
  - How to ensure reliability of virtual measurements, digital twins, etc.?
  - Conventional notion of traceability chain difficult in sensor networks
  - Important to monitor intrinsic standards (“in-situ traceability”, “NIST-on-a-chip”) to see if they stay good
- FORUM-MD discussion group DG-SN on sensor networks was created (precursor to TG)
- *Metrologia*
  - 1 January 2026 change to full Open Access
  - CIPM wants *Metrologia* liaison person from each CC

WORKSHOP AND PLENARY MEETING MARCH 2026

FORUM-MD workshop – March 2026

“AI in a metrological context: AI for metrology and metrology for AI”

- Martina Paul (ISO/IEC): LLM’s are “stochastic parrots” ⇒ determining functional correctness gets complicated quickly, domain / application must be narrowly defined
- Thomas Doms (AIQI, TUV Austria): AI performance can change after deployment, via updates & drift ⇒ need monitoring throughout entire life of system
- Jeff Gust (Fluke): Fluke working on AI product that uses webcam to automate calibrations of equipment that is not machine interfaceable (numeric displays, dial gauges, etc.)
  - Two steps forward, one step back
  - Communication disconnect between AI devs (“10 % or 50 % success rate is great!”) and metrologists (“wow, that is terrible”)
  - AI considerations regarding ISO 17025 clauses: impartiality, confidentiality, validity of results, control of data
- Panel discussion:
  - Best reference testing data set is one we fully understand, not necessarily cleanest / lowest noise (and must be kept private, so it is not harvested into AI training data sets); topic of uncertainty when AI is involved is important to study going forward
  - Big AI developers won’t take NMIs seriously ⇒ better for NMIs to engage with government on the AI regulation side
  - AI will get better at fooling NMIs ⇒ NMIs still need to maintain good human-based metrological knowledge to test them

Plenary meeting of FORUM-MD – March 2026

- FORUM-MD chair: look at common, overarching use cases, interactions between TGs / WGs on common questions
- BIPM update:
  - Digitalization team will be hiring, but need NMI partnerships, secondments, joint technical projects to get new (especially digitalization) things done
  - Provide infrastructure & digital working spaces, host as many useful (NMI- & CC-developed) tools as possible
  - Fully machine-actionable KCDB 3.0
  - Document repository → FORUM-MD-WG-CC to coordinate feedback & specifically-interested CCs should reach out too
- Outreach is important: NASA just adopted a digital unit framework from WMO not BIPM
- DCCs:
  - PDF/A-3 + embedded XML is good format
  - Human acceptance of DCCs is bigger challenge than technical parts – business clients not so interested, concerns about cost & time, want Digital Calibration Requests (DCR) first
- DG-SN promoted to TG-SN → Shahin Tabandeh (VTT MIKES, CCT-WG-Dig) is a member

HUMIDITY QUANTITIES IN SI DIGITAL FRAMEWORK

Humidity quantities in SI Digital Framework: Discussion at FORUM-MD-WG-CC meeting, March 2026

CCT-WG-Dig feedback on BIPM's SI Digital Framework: request to use "%rh"

- Richard Brown (President of CCU, NPL Head of Metrology):
  - No subscript / identifier allowed in SI and SI Digital Framework, because it would open door to lots of chemistry e.g. x_1 per x_2 things
- Anna Cypionka (BIPM) & Cristhian Paredes (BIPM):
  - SI Reference Point (SIRP) is a direct implementation of the SI Brochure ⇒ not flexible
  - The wider SI Digital Framework (SIDF) is more flexible and should be able to accommodate all of this
  - *Quantities* (SIDF) rather than *Units* (SIRP)
- They may set up another meeting to discuss further

DRAFT CGPM RESOLUTION

CGPM 2026 Draft Resolution E:
On the further digital transformation of the global metrology system

…**encourages the CIPM** to further intensify and expand its strong engagement in ensuring that the Metre Convention becomes fully accessible for all in the digital era, by

- extending the SI Reference Point into a comprehensive and authoritative digital framework that allows the machine-actionable conversion between the SI and other systems of units, as well as between different digital representations of units,
- fostering harmonization to ensure conceptual consistency and interoperability across the overall digital metrological framework, including the use of standardized data exchange formats and knowledge modelling approaches,
- facilitating the advancement of digital metrology for artificial intelligence (AI) and complex systems, including the reliable integration and quality assurance of large-scale sensor networks

Thank you

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