



Advanced metrology research for industrial innovation and societal challenges

World Metrology Day Seminar RISE & Big Science Sweden 20 May 2020

Hans Arne Frøystein EURAMET Chairperson



### Themes



- EURAMET
- Trust in measurements across borders
- European metrology research programmes
- Results, impact and innovation from the programmes
- A new partnership?

## EURAMET e. V.



An association established in Braunschweig, Germany under German law

Is the regional metrology organisation for Europe, securing world-wide trust and acceptance of european measurements

**EU-supported Research Programmes** 

Members:

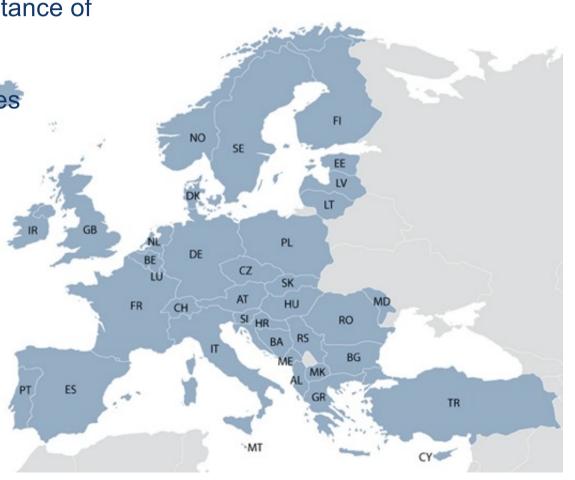
38 European NMIs

Associates:

78 DIs

Liaison Organisations:

RMOs & BIPM NMIs beyond Europe KMA (Kosovo under UNSCR 1244) Regional/international Organisations



# 13th EURAMET General Assembly

21 to 25 May 2019, Borås, Sweden



- More than 100 participants from Members, Associates, Research Council, Liaison Organisations
- Two Nobel Laureates: Bill Phillips, Klaus von Klitzing
- Representatives from BIPM, APMP, COOMET, SIM



### **EURAMET Chairpersons and GS**





CHAIRPERSON

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About Maria Luisa >>



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About Erkki >>



GENERAL SECRETARY Dr Duncan Jarvis

### **Board of Directors**



Name	Institute	Country	Position
Frøystein, Hans Arne	JV	Norway	Chairperson
Rastello, Maria Luisa	INRIM	Italy	Vice-Chairperson (GA)
Ikonen, Erkki	VTT	Finland	Vice-Chairperson (EMPIR)
Jeckelmann, Beat	METAS	Switzerland	Member
Chambon, Maguelonne	LNE	France	Member
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Edelmeier, Robert	BEV	Austria	Member
Klenovský, Pavel	CMI	Czech Republic	Member
Stenger, Jörn	PTB	Germany	Member

# **Technical Committee Chairs**



TC	TC-Chair	Institute	Country
AUV	Robinson, Stephen	NPL	United Kingdom
EM	Zeier, Markus	METAS	Switzerland
F	Care, Isabelle	LNE-CETIAT	France
IM	Dobre, Miruna	SMD	Belgium
IR	Ankerhold, Ulrike	PTB	Germany
L	Prieto, Emilio	CEM	Spain
М	Arrhén, Fredrik	RISE	Sweden
MC	Vaslin-Reimann, Sophie	LNE	France
PR	Kück, Stefan	PTB	Germany
Q	Stoll-Malke, Kai	PTB	Germany
Т	Del Campo, Dolores	CEM	Spain
TF	Whibberley, Peter	NPL	United Kingdom

# Approved European Metrology Networks (EMNs)



Title	Chair (acting)	Website	
Mathmet	Markus Bär (PTB)	https://www.euramet.org/mathmet	
Quantum Technologies	Ivo Degiovanni (INRIM)	https://www.euramet.org/quantum-technologies	
Laboratory Medicine	Rainer Stosch (PTB)	https://www.euramet.org/laborat ory-medicine	
Smart Electricity Grids	Gert Rietveld (VSL)	https://www.euramet.org/smart- grids	
Energy Gases	Annarita Baldan (VSL)	https://www.euramet.org/energy -gases	
Climate and Ocean Observation	Emma Woolliams (NPL)	https://www.euramet.org/climat e-ocean	

### **EURAMET Secretariat**



#### **Management Board**

General Secretary – Duncan Jarvis Member Service Manager – Julien Vuillemin-Toledo Programme Manager – Dagmar Auerbach

# Member Service Activities

Activities relevant to membership e.g. GA

Support to TCs and TC chairs including TC-Q secretary

Relationships with other RMOs and the JCRB

# Overhead activites

General administration and IT infrastructure including website
Communication activities
Internal quality system
Financial and legal advice

#### **Programmes**

Programme call, selection and reporting activities

Impact support

Interface with the EC Research Council

**Capacity Building** 

**Network support** 

#### **Contact the Braunschweig office**

+49 531 592 1960

# Contact the Teddington office

+44 20 8943 6666



#### Reconnaissance mutuelle

des étalons nationaux de mesure et des certificats d'étalonnage et de mesurage émis par les laboratoires nationaux de métrologie

Paris, le 14 octobre 1999

Supplément technique révisé en octobre 2003 (pages 17-20)



#### Mutual recognition

of national measurement standards and of calibration and measurement certificates issued by national metrology institutes

Paris, 14 October 1999

Technical Supplement revised in October 2003 (pages 38-41)

#### Comité international des poids et mesures

Bureau Organisation international intergouvernementale des poids de la Convention et mesures du Mètre

# Signatories: 60 Members 40 Associates 4 Int. org.

# Requirements: QMS Comparisons CMCs

# Regional Metrology Organisations of the world





# What are the Metrology Research Programmes?



- They are about improving measurement to drive innovation and competitiveness.
- They enable European metrology institutes, industrial organisations and academia to collaborate on joint research projects.
- They are implemented by EURAMET
  - based on Article 185 of the Lisbon Treaty,
  - jointly funded by the participating countries and the European Union (over 1 B€)

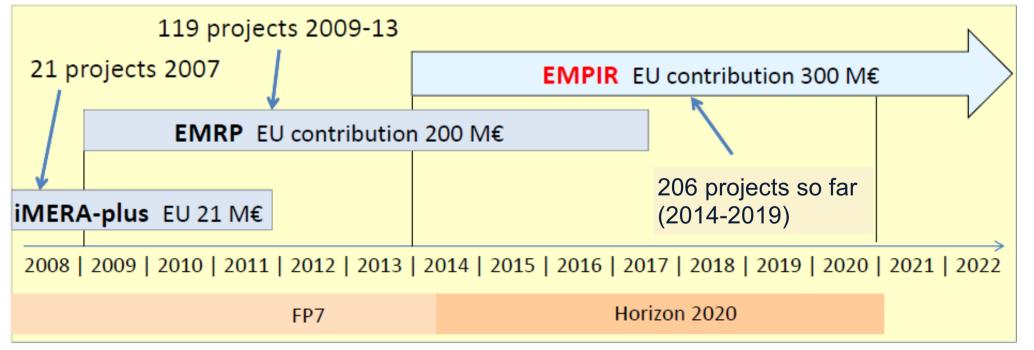
## Research Programmes



Implemented by EURAMET; Current programme EMPIR:

- Annual calls between 2014 and 2020
- Thematic calls on
  - Fundamental science
  - Grand challenges
  - SI traceability

- Innovation in industry
- Standardisation
- Capacity building
- Support for EMNs



## **EMPIR** objectives



#### **Boost industrial uptake and improve standardisation**

- At least 400 M€ of European turnover from new or significantly improved products and services that can be attributed to the research activities of EMPIR and its predecessors
- At least 60 % of CEN/CENELEC /ISO/IEC Technical Committees and equivalent standardisation bodies with potential to benefit directly from EMPIR projects to engage with the programme

# Underpin a coherent, sustainable and integrated European metrology landscape to fully exploit the EU potential

- Maintain a level of at least 50 % of dedicated national metrology research investments in Europe being coordinated or influenced via the programme
- All European NMIs and their designated institutes to interact with the programme
- European leadership in at least 20 % of international metrology committees

#### EURAMET's European Metrology Research Programme at a glance



Pooling expertise of

Dls from 23 European countries

plus the NMIs from Australia, Brazil, Canada, China,

articles in peer-reviewed iournals

training activities

236 academic research groups

Japan, Mexico, New Zealand, the Republic of Korea and the Russian Federation

presentations at conferences

technical committees and working groups of standards organisations

contributions to draft standards and published standards

presentations at workshops and seminars, reaching an audience of people

businesses

and 50 other organisations





Supported the development of improved instruments and machines with projected sales of

# Many projects contributed to the new SI





# Ionising metrology research for the metallurgical industry



Uptake by

Sidenor Aceros Especiales (ES)

Cyclife Sweden AB (SE)



### Confidence in recycled steel

Almost half the steel produced in Europe is recycled from scrap materials. These materials come from a variety of sources, some of which may be radioactively contaminated, such as waste from industry, medical facilities and decommissioned nuclear power plants. Given the potential hazards posed by radiation exposure, improved measurement methods and standards are needed to assess the radioactivity of recycled steel and comply with EU regulations designed to protect Europe's citizens.

# Metrology to underpin Future Regulation on Industrial Emissions

EURAMET

Uptake by

FluxSense AB



#### Industrial emissions mapping

The EU's Industrial Emissions Directive, which aims to protect human health and the environment, requires pollution reporting from oil and gas plant operators against regulated emissions limits. Strict standards are being established for monitoring total plant emissions, but current measurement techniques lack the required accuracy to meet new lower emission limits. Optical measurement techniques can meet requirements, but to be authorised for use, must first be rigorously validated.

# Metrology for the characterisation of biomolecular interfaces for diagnostic devices



Uptake by

**BOKU Univ, Vienna (AT)** 

Univ Göttingen (DE)



#### Simpler disease diagnostics

Biomarkers are small molecules found in the bloodstream, which can be directly related to diseases such as cancer, HIV and Hepatitis. At the heart of many new diagnostic tools, biomarkers enable early detection of disease making successful treatment more likely. However, their small size and often low numbers can hamper detection without expensive specialist equipment. Innovation in measurement cell design is needed for simple and low-cost biomarker detection in complex samples.

# Compact and high-performing microwave clocks for industrial applications



Uptake by

Musquans (FR)



#### Transportable atomic clocks

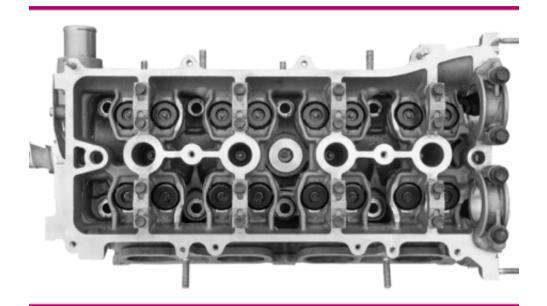
Atomic timekeeping provides communication systems relaying information with very precise timestamping, and navigation systems with the ability to exactly pinpoint locations. The most accurate atomic clocks rely on expert staff maintaining complex operating conditions to ensure their performance. As applications requiring precise timekeeping increase, simpler yet highly accurate atomic clocks, suitable for use without expert supervision, are needed to supply the accuracy needed by industry and commerce.

# Traceability for computationallyintensive metrology



Uptake by

Mitutoyo (JP)



#### Trusting complex software

Complex software is key to analysing measurements used to assess quality. It turns huge measurement datasets into the information needed to check products, from cars to microchips, have been manufactured correctly. But such software contains vast amounts of complex code, so confirming it works as intended is extremely challenging. As products become more complex, manufacturers need greater confidence in measurement accuracy and new independent methods to verify software are required.

# Non-conventional voltage and current sensor for future power

grids

Uptake by

CONDIS SA (CH)





#### New sensors for the high voltage grid

Conventional electricity grids are being replaced by smart grids which can rapidly respond to changes in electricity flow in real-time and better integrate energy from renewable sources. To monitor these grids a new generation of network sensors, termed 'low-power instrument transformers' are being introduced which must be compliant to international standards. However, the variety of primary sensors, and secondary converters, brings up new challenges for the calibration of

# A new partnership?



- Discussions with EC about EMPIR follow-up programme have progressed and a "common understanding" between Commission Council and Parliament has been published listing an Institutional Partnership in Metrology to be part of Horizon Europe.
- An impact assessment was performed in 2019 led by Technopolis.
- An open public consultation was held in 2019 we generated 265 replies
- A formal proposal is being developed by Euramet and the EC, late 2019/early 2020, for approval by the Council of Ministers and the European Parliament, hopefully in 2020 (maybe 2021), for a start and first call in 2021.
- "EMP" will be a European programme, but open for participation worldwide, as the present programme

## European Partnership om Metrology



Metrology as a generic competence, globally trusted measurements for all parts of society:

- Industrial innovation
- Solutions for global societal challenges
- Trade
- Regulations and written standards

Will be aligned with Horizon Europe priorities, its policies (including UN SDGs), missions and clusters:

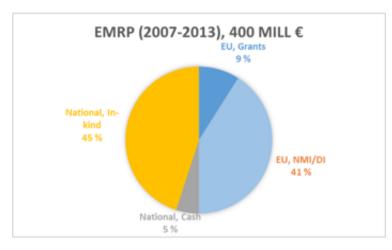
#### Clusters:

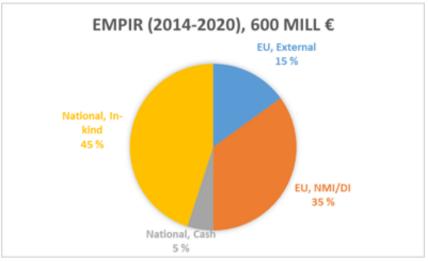
- Health
- Culture, Creativity and Inclusive Society
- Digital, Industry and Space
- Climate, Energy and Mobility
- Food, Bioeconomy, Natural Resources, Agriculture and Environment

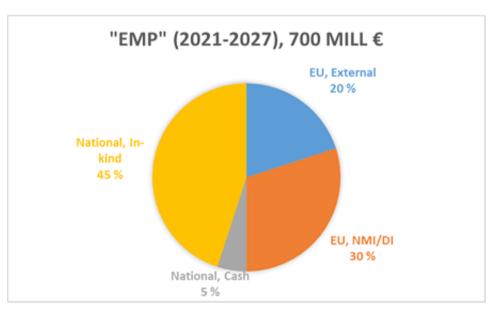
Sustainable metrology system for the future

# R&D&I programmes 2007 - 2027









Tentative, proposed budget and split

