

A new level of joint, coordinated metrology research: the EMRP

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Abstract – European metrology research has taken an unprecedented step towards scientific, management and financial integration. The projects in the 63 M€ ERANET-plus programme “iMERA-plus” are coming to an end and the first projects of the 400 M€ Article-185 initiative “European Metrology Research Programme, EMRP” have started. The EMRP is characterized by a joint research strategy, joint execution structures and processes in EURAMET and stable national financial commitments.

Keywords EMRP, EURAMET

1. INTRODUCTION

The European Metrology Research Programme (EMRP) was established in 2009 by the twenty-two participating countries and the European Union, utilising Article 169 (now Article 185) of the European Treaty. The core activity of the EMRP consists of multi-partner transnational joint research projects to advance metrology and its applications. EURAMET - the European Association of National Metrology Institutes - is the body responsible for the implementation of the EMRP.

2. TOWARDS ENHANCED SCIENTIFIC, MANAGEMENT AND FINANCIAL INTEGRATION

The outline of the research programme was established in 2006 as one of the deliverables of a joint project of European metrologists (“iMERA”). Based on a comprehensive roadmapping in the Technical Committees of EURAMET the research agenda for the next 10 years was formulated responding to the „Grand Challenges“ in Energy, Environment, Health, New Technologies (such as related to safety/security, nanotechnology, biotechnology and others) as well as responding to specific needs from industry and other stakeholders. In parallel, processes and structures were developed to enable EURAMET to execute the programme under the Article 169 of the European treaty. This Article permits the European Commission to co-fund a programme which is developed and executed by (not necessarily all) European member states.

The EU co-funds the the iMERA-plus programme with 21 M€ and the EMRP under Article 169 with 200 M€. The expectations are significant contributions on a scientific-technical level and a threefold integration on a political

level: the scientific, management and financial integration of the European metrology research landscape.

All structures and processes of the implementation body within EURAMET have been jointly developed between European Commission, European Parliament and the member states. The most important bodies are the EMRP committee and the management support unit which manages the programme. The EMRP committee is the decision making body. It is composed of one member of each of the 22 participating states. For example, it decides on the research agenda, i.e. on the sequence of Targeted Programmes (TPs), their strategic scopes and budgets.

A call consists of several steps. First, a call for proposed research topics is issued. The EMRP committee sifts the ideas and defines “Specific Research Topics, SRTs”, which are the basis for future typical 3M€, 3 years joint research projects. The EMRP Committee members bring their knowledge of national capabilities and national priorities, they think at a strategic level above the individual technical areas and prioritise topics where the stakeholder need is clearly demonstrated and the benefits to be gained from the involvement of the metrology community are greatest.

On the basis of a second call the metrologists form consortia and propose concrete project proposals which are reviewed by independent referees and a ranked list of proposals is established. The EMRP committee finally decides where the budget line separating funded from unfunded projects in that list is put. An international expert panel, the Research Council, advises on the programme and future strategic decisions.

For the running programme, EURAMET has full responsibility for a successful execution including all financial management and reporting.

EURAMET has introduced a fair way to reflect the different national financial contributions in the decision processes. By scaling the voting weights in the EMRP committee using a square root law for the national commitments, neither the small countries are dominated by few big countries nor the big countries are easily outweighed by a group of small ones. However, decisions are reached in consensus in most cases.

Fig. 1 shows the distribution of the financial commitment and the voting weights. The national financial contributions correspond to large parts of the national metrology research programmes in many cases. In all cases, the participation in the EMRP deeply affects the way metrology research is planned and done in the member states. In fact, a survey has shown that no country would

like to reduce its commitment, in contrast, many would like to have more resources available for the EMRP.

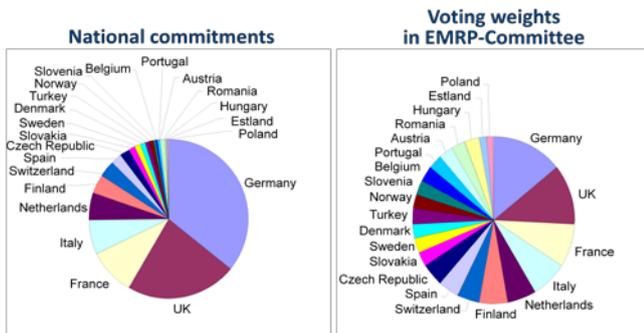


Fig. 1. The national financial commitments of the 22 participating states adding up to 200 M€ and their voting weights in EMRP committee.

Fig. 2 shows the sequence of the TPs of the EMRP.

EMRP under ERAnet-plus: iMERA-plus		EMRP under Article 169/185	
2007	SI Fundamentals	2009	Energy
	Health	2010	Environment
	Length metrology		Industry
	Electromagnetism	2011	Health
			SI broader scope
		2012	Industry
			SI Broader Scope
			Open Excellence
		2013	Environment
			Energy

Fig. 2. The sequence of the calls of the EMRP. The projects start in the year after a call has been issued. Thus the last projects of the EMRP will end in 2016.

The first 21 projects of the EMRP under the ERAnet-plus instrument finish this summer¹. They addressed the following themes:

The watt balance route towards a new definition of the kilogram
Avogadro and molar Planck constants for the redefinition of the kilogram
Foundations for a redefinition of the SI base unit ampere
Determination of the Boltzmann constant for the redefinition of the kelvin
Optical clocks for a new definition of the second
Towards quantum-based photon standards
Breath analysis as a diagnostic tool for early disease detection
Metrology on a cellular scale for regenerative medicine
Increasing cancer treatment efficacy using 3D brachytherapy
External Beam Cancer Therapy
Traceable measurements for biospecies and ion activity in clinical chemistry
Traceability of complex biomolecules and biomarkers in diagnostics
Traceable characterization of nanoparticles
New Traceability Routes for Nanometrology
Metrology for New Industrial Measurement Technologies
Absolute long distance measurement in air

¹ in fact, iMERA-plus was the first running ERAnet-plus programme at all

Next generation of power and energy measuring techniques
Nanomagnetism and Spintronics
Next generation of quantum voltage systems
Enabling ultimate metrological Quantum Hall Effect devices
Traceable measurement of field strength and SAR for the Physical Agents Directive

Typically 7 partners from different countries worked together in the iMERA-plus projects. In Targeted Programme on Energy, which was the first programme of the EMRP under Article 169, this number has grown to 13. The themes include:

Characterization of energy gases
Energy harvesting
Liquified Natural Gas
Smart electrical grids
Solid-state lighting
Improved power plant efficiency
High-voltage DC
New generation of nuclear power plants
Biofuels

3. SUMMARY AND FUTURE INITIATIVES

The EMRP is up and running, and, including iMERA-plus, about 100 scientific articles have already been published. EURAMET has demonstrated its capability to run a joint research programme. The member states have demonstrated their strong commitment to the programme. Thus, in addition to the scientific-technical achievements, the scientific, management and financial integration has been demonstrated.

In parallel to the strategy development of the European Union for the research funding after the 7th framework programme, EURAMET has already started to think about a possible successor initiative to the EMRP. Key ideas are to construct three pillars, addressing fundamental metrology research, grand challenges (environment, energy, health), and innovation. Research projects addressing fundamental metrology and grand challenges should look similar to the EMRP-type projects. New approaches need to be introduced to address innovation more systematically and cover the whole metrological innovation chain not only from basic research to pre-commercial development but take the extra step across the “innovation gap” and enable technology transfer into industry and market uptake of research and development results. By these new mechanisms, EURAMET will respond to the flagship initiative “Innovation Union” of the European Union.

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