

Title: Metrology research potential development in the Baltic region

Abstract

The metrological infrastructure in the Baltic region needs to be strengthened by implementing joint activities for the development of measurement methods for national standards in the fields of length and dimensional quantities, temperature and optical quantities. Such capacity building activities, delivered through increased European and regional co-operation, will leave the Baltic region better prepared to meet future metrological challenges.

Keywords

National metrology strategy, metrology research potential, capacity building, Baltic region, standardisation

Background to the Metrological Challenges

National measurement standards in the Baltic region are maintained and developed to better serve local needs for reliable and traceable measurements. However, the demands set by industry (e.g. competition, innovation) and society (e.g. health) are often too challenging to be met by the Baltic NMIs and DIs alone. Both, traditional measurement areas, as well as, key growth areas e.g. ICT, health technologies and sustainable energy, need a joint 'research potential' approach to be successfully addressed.

To investigate the need for new and existing metrology services a survey was conducted in a Baltic State (Estonia) in 2010 - 2011 [1]. It showed that the availability of reliable measurement services is essential for the functioning of the economy and that the areas of mass, length and dimensional quantities, temperature, electrical quantities, time and frequency need to be covered in greater scope and with greater accuracy. Requirements were further analysed in 2012 - 2013 by assessing the measurement ranges and target uncertainties required in each measurement field. Based on this, an investment plan was prepared for 2014 - 2018 for the development of metrology services and related research. This capacity building work needs further support to enable the other Baltic States (Latvia and Lithuania) to contribute at a European level in metrology development projects and programmes.

The fields of length, temperature and optics have been selected for capacity building activities in the Baltic region for the following reasons. In dimensional metrology, both tactile and new non-contact measurement techniques are challenging, and because of the complexity of coordinate measuring machines, the Baltic States require cooperation from other NMIs to increase their knowledge of coordinate metrology. Further capacity is needed in determining traceability routes, uncertainty evaluation, error separation techniques and comparison measurements. In temperature metrology, low temperature measurements, from $-80\text{ }^{\circ}\text{C}$ to $-196\text{ }^{\circ}\text{C}$, are needed for the cryopreservation of cells, tissues, organs, or whole organisms by hospitals, health care institutions and biology research institutions. Further capacity is needed in the Baltic States to ensure traceability at low temperatures. In optical metrology, developments in lighting technology (e.g. enhanced use of LED, OLED-lamps) and the diversity of measurements based on spectral quantities (e.g. colour, gloss etc.) are of increasing importance in Baltic States (e.g. Baltic Photonic Cluster, Cybernetica AS, Baltic Photometric Laboratory). Further capacity is needed in the Baltic States to ensure reliable and traceable optical measurements.

Objectives

Proposers should address the objectives stated below, which are based on the PRT submissions. Proposers may identify amendments to the objectives or choose to address a subset of them in order to maximise the overall impact, or address budgetary or scientific / technical constraints, but the reasons for this should be clearly stated in the protocol.

The JRP shall focus on the development of metrological capacity in the Baltic region.

The specific objectives are

1. To develop new, or update existing, measurement methods in the fields of length and temperature in the Baltic region. This should make use of existing equipment or equipment that will shortly be available. The methods developed should be intercompared with existing methods from within the European metrology community, thus leading to enhanced measurement capabilities in the Baltic region.
2. To establish research capability for performing accurate and traceable measurements with new equipment e.g. dimensional measurements of complicated objects using high precision coordinate measuring machines, temperature measurements within the range from -150 °C to +1200 °C, and detector calibration based on monochromator-radiation in the visible/near infrared wavelength range.
3. To build research potential in the Baltic region in order to enable a higher contribution to EURAMET/EMPIR joint activities and to metrology and standardisation projects.
4. To strengthen co-operation between NMIs and the universities in the Baltic and Nordic region to enable efficient use of existing metrology and academic/research competence and limited resources in the development of measurement methods and metrology services. This could include holding awareness workshops with other Baltic countries, which are not yet involved in EMPIR activities (Latvia and Lithuania), in order to study ways for smart specialisation in metrology in the Baltic region.
5. For each participant, to develop an individual strategy for the long-term operation of the capacity developed, including regulatory support, research collaborations, quality schemes and accreditation. They should also develop a strategy for offering calibration services from the established facilities to their own country and neighbouring countries. The individual strategies should be discussed within the consortium and with other EURAMET NMIs/DIs, to ensure that a coordinated and optimised approach to the development of traceability in this field is developed for Europe as a whole.

Joint Research Proposals submitted against this SRT should identify

- the particular metrology needs of stakeholders in the region,
- the research capabilities that should be developed (as clear technical objectives),
- the impact this will have on the industrial competitiveness and societal needs of the region,
- how the research capability will be sustained and further developed after the project ends.

The development of the research potential should be to a level that would enable participation in other TPs.

Proposers should note that the programme funds the activity of researchers to develop the capability, not the required infrastructure and capital equipment, which must be provided from other sources.

EURAMET has defined an upper limit of 500 k€ for the EU Contribution to any project in this TP, and a minimum of 100 k€.

EURAMET also expects the EU Contribution to the external funded partners to not exceed 10 % of the total EU Contribution to the project. Any deviation from this must be justified.

Potential Impact

Proposals must demonstrate adequate and appropriate participation/links to the “end user” community, describing how the project partners will engage with relevant communities during the project to facilitate knowledge transfer and accelerate the uptake of project outputs. Evidence of support from the “end user” community (e.g. letters of support) is also encouraged.

You should detail how your JRP results are going to:

- Address the SRT objectives and deliver solutions to the documented needs,

- Provide a lasting improvement in the European metrological capability and infrastructure beyond the lifetime of the project,
- Facilitate improved industrial capability or improved quality of life for European citizens in terms of personal health or protection of the environment,
- Transfer knowledge to the length, temperature and optical sectors and the metrology community.

You should detail other impacts of your proposed JRP as specified in the document “Guide 4: Writing Joint Research Projects (JRPs)”.

You should also detail how your approach to realising the objectives will further the aim of EMPIR to develop a coherent approach at the European level in the field of metrology and include the best available contributions from across the metrology community. Specifically the opportunities for:

- improvement of the efficiency of use of available resources to better meet metrological needs and to assure the traceability of national standards
- the metrology capacity of EURAMET Member States whose metrology programmes are at an early stage of development to be increased
- organisations other than NMIs and DIs to be involved in the work

Time-scale

The project should be of up to 3 years duration.

Additional information

The references were provided by PRT submitters; proposers should therefore establish the relevance of any references.

[1] http://www.bipm.org/en/practical_info/useful_links/impact.html