

Important information about these documents

This call is being held ahead of any agreement from the Commission that the relevant funding will be available. At present the relevant legislation is still under discussion in both Council and Parliament, and there is no certainty on the detailed arrangements for funding selected projects. The funding of any selected project, and the terms and conditions of participation in the projects, are dependent on completion of the legislative process and the subsequent contractual processes between the European Commission and EURAMET. Proposers submit to this call at their own risk.

Background

Last year, EURAMET submitted a draft proposal to the EC for a further research programme to be established under article 185 of the Treaty on the Functioning of the European Union (TFEU) to follow on from EMRP and EMPIR. This was published by the EC at https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-digital-industry-and-space_en

The initiative would be called the European Partnership on Metrology and would aim to create, by 2030, a sustainable and effective system for metrology at European level that ensures Europe has a world-class metrology system that:

- Provides metrology solutions, fundamental metrological reference data and methods, offering fit-for-purpose solutions supporting and stimulating European innovation and responding to societal challenges.
- Supports and enables effective design and implementation of regulation and standards that underpin public policies that address societal challenges.

The Commission commissioned an impact assessment into this proposal and 11 others in similar priority areas, and, based on those findings, published their own proposal for the Partnership, their response to the impact assessment and a draft of the Decision on 23rd February 2021. See:

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:89:FIN>

https://ec.europa.eu/commission/presscorner/detail/en/ip_21_702

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021SC0035&qid=1614677899327>

That draft Decision is currently under discussion in the European Council and the European Parliament.

Under the assumption that the Council and Parliament pass the basic act which would form the legal basis for this research programme, and that the participating countries named in the Draft Decision submit the required commitment letters, EURAMET is publishing these potential Selected Research Topics and draft guidance notes. These documents are not approved by the Commission nor will they lead to a binding decision by EURAMET e.V. for any further negotiation or funding. All published guides and templates are subject to amendment by the EC and EURAMET e.V. as further information becomes known.

Title: Improved metrology for non-conventional measuring instruments with additional integrated functionalities

Abstract

Legal metrology is a typically conservative area that has traditionally been focussed on the conventional image of a measuring instrument as an 'isolated box' with a single function and display. In contrast, new, non-conventional measuring instruments are becoming increasingly less of an 'isolated box' and instead integrated with additional functionalities such as artificial intelligence, diagnostics and remote assessment and management. The integration of additional functions provides the opportunity to assess the metrological performance of non-conventional measuring instruments in real-time. However, it also leads to issues when trying to separate the metrologically relevant parts of the instruments from the other integrated functions. To address this issue, WELMEC has released a priority research topic on non-conventional measuring instruments and the need for the development of improved metrology. The improved metrology should build upon existing legislation and ensure trustworthy data transfer and measurement verification of the non-conventional integrated measuring instruments. The end goal is to support legal metrology in keeping pace with the fast developments in technology and to allow end users to benefit from the use of non-conventional measuring instruments with additional integrated functionalities.

Keywords

Legal metrology, conformity assessment, integrated functionalities, diagnostics, artificial intelligence, remote management and assessment, verification

Background to the Metrological Challenges

New, non-conventional measuring instruments are increasingly being connected to the internet/cloud. Typically, the additional functions of the non-conventional measuring instrument tend to be physically integrated within the metrologically relevant parts of the instrument and then driven by triggers in the cloud. But separate sensors can also be connected to or integrated with smartphones and hence form versatile measuring instruments.

So far, the metrological community has coped with these changes using approaches based on the conventional image of a measuring instrument as an 'isolated box' with a single function. For example, software version numbers and checksums must be available in the type evaluation certificate and in the measurement instrument itself. However, greater progress could be made if these conventional approaches were replaced with new metrological approaches that take advantage of self-diagnostics and remote assessment and verification. At present measurement instruments have to be brought in for reverification at regular time intervals (typically one to two years). However, by using self-diagnostics and new techniques such as artificial intelligence, together with non-conventional integrated measuring instruments, real-time verification of measurement data could become possible.

Manufacturers are continuously developing new ways of improving their equipment. In the last few years, they have started introducing internal self-diagnostics into measuring instruments in order to track instrument performance and to send warnings when it is not functioning properly. For example, electricity meters have been developed that can report if they experience detrimental signals (e.g. EMI). However, although some EC member states allow the use of self-diagnostics for instrument monitoring, there is currently no consensus on the requirements or conditions under which diagnostics could be accepted for legal metrology purposes.

The development of improved metrology for non-conventional measuring instruments, is particularly important for two areas in Europe. Firstly, the Energy Efficiency Directive (2012/27/EU), which requires member states to introduce quarterly hour variable tariffs to stimulate energy efficient consumer behaviour, and secondly, electric vehicle charging stations, which currently have no meter reading display. Therefore, consumers have to depend on the information supplied by their mobile service provider.

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 necessary improved metrology needed to support standardisation in non-conventional measuring instruments with additional integrated functionalities.

The specific objectives are

1. To investigate the use of internal diagnostics as a tool to ensure the appropriate functioning of non-conventional measuring instruments with additional integrated functionalities. This should include enhanced information on the accuracy, quality, and limits of internal diagnostic measurements, such that they can be used to improve confidence in measurement stability over time and reduce the need for metrological testing. In addition, to select at least 3 different and robust test cases and then demonstrate and validate the use of internal diagnostics as a tool for the appropriate functioning of non-conventional measurement instruments.
2. To develop methods for the remote reading, validation, storage, and access to data from non-conventional measuring instruments with additional integrated functionalities. The methods should meet current legislation in legal metrology and ensure the integrity and security of the data (i.e. transferred data must correspond to locally measured values). In addition, to validate these methods using the test cases from Objective 1.
3. Using information from Objective 2, to investigate the potential use of the (internet) cloud in the remote metrological validation of non-conventional integrated measuring instruments and their associated software.
4. To develop an approach for the remote conformity assessment of the metrologically relevant parts of non-conventional measuring instruments with additional integrated functionalities. This should include the determination of suitable surveillance mechanisms for remote conformity assessment and an investigation of the potential use of artificial intelligence. In addition, to validate the approach for remote conformity assessment using the test cases from Objective 1.
5. To contribute to the regulatory development work of WELMEC to ensure that the outputs of the project are aligned with their needs, communicated quickly to those developing the regulation (e.g. bodies associated with the Energy Efficiency Directive (2012/27/EU) and the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW)) and to those who will use them (e.g. the energy and car manufacturing sectors), and in a form that can be incorporated into the regulation at the earliest opportunity.

The proposed research shall be justified by clear reference to the measurement needs within strategic documents published by the relevant Regulatory body or Standards Developing Organisation or by a letter signed by the convenor of the respective TC/WG. EURAMET encourages proposals that include representatives from industry, regulators and standardisation bodies actively participating in the projects. The proposal must name a "Chief Stakeholder", not a member of the consortium, but a representative of the user community that will benefit from the proposed work. The "Chief Stakeholder" should write a letter of support explaining how their organisation will make use of the outcomes from the research, be consulted regularly by the consortium during the project to ensure that the planned outcomes are still relevant, and be prepared to report to EURAMET on the benefits they have gained from the project.

Proposers should establish the current state of the art, and explain how their proposed research goes beyond this. In particular, proposers should outline the achievements of the EMPIR project 17IND02 SmartCom and how their proposal will build on this.

EURAMET expects the average EU Contribution for the selected JRPs in this TP to be 0.8 M€, and has defined an upper limit of 1.0 M€ for this project.

EURAMET also expects the EU Contribution to the external funded partners to not exceed 30 % of the total EU Contribution across all selected projects in this TP.

Any industrial partners that will receive significant benefit from the results of the proposed project are expected to be unfunded partners.

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,

- Feed into the development of urgent documentary standards and regulation through appropriate bodies,
- Transfer knowledge to the legal metrology, energy and car manufacturing sectors.

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 the potential European Partnership on Metrology 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] WELMEC priority research topic Nonconventional measuring instruments

https://msu.euramet.org/current_calls/pre_norm_2021/documents/welmec_priority_001.pdf