Potential European Partnership on Metrology
Call 2021 – Green Deal and Normative

Selected Research Topic number: **SRT-v05**
Version: 1.1

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.

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Title: Metrology supported solutions to understand and control antimicrobial resistance in the environment

Abstract

Antimicrobial resistance, resulting from the use and overuse of antibiotics, places a heavy economic burden on society through its impact on human and animal health. Although, the environment is known to act as a reservoir of antimicrobial resistance, at present, surveillance systems mainly focus on antimicrobial resistance in humans and animals. Therefore, metrology supported solutions, including surveillance systems, need to be developed and implemented to understand and control the drivers and burden of antimicrobial resistance in soils and aquatic environments. This is expected to lead to the development of traceability chains to tackle antimicrobial resistance.

Keywords

Antibiotics, antimicrobial resistance, biocides, biofilms, databases, diagnostic tools, environment, indicators, monitoring, risk assessments, sampling, sediments, soils, water

Background to the Metrological Challenges

Antimicrobial resistance directly impacts human and animal health, claiming an estimated 33 000 human lives each year in the EU. It also causes a heavy economic burden on society from higher treatment costs and lower productivity as a result of sickness. The use and overuse of antibiotics is an initial factor in the emergence and maintenance of antimicrobial resistance, which spreads via the acquisition of resistance genes. Subsequent transmission then occurs through person-to-person contact, wastewater, animals or through other activities such as the spreading of residues. Therefore, the environment, especially when polluted, can act as a reservoir of antimicrobial resistance and could enhance its spread. For example, the hydrological cycle has been shown to contribute to the spread of antimicrobial resistance as it connects people, animals and the environment.

To address the use and overuse of antibiotics, the EC has set a target of reducing the sale of antimicrobials, for use in farming and aquaculture, by 50 % by 2030. In addition, the EC are also addressing the environmental transmission of antimicrobial resistance through the “EU’s chemicals strategy for sustainability towards a toxic-free environment”. This strategy includes strengthening the protection of human health and the environment via monitoring substances in water, soils, sediments, and wildlife, using conventional analytical and complementary techniques. Antimicrobials, and possibly antimicrobial resistance genes, will also be studied in the EC’s “Land Use and Coverage Area frame Survey” soil survey, and the feasibility of monitoring antimicrobially resistant microorganisms and antimicrobial resistance genes will be added to the watch list of the Water Framework Directive. In addition, the EC’s Pharmaceutical Strategy for Europe will address antimicrobial resistance challenges including the inappropriate use of antibiotics by improving awareness of antimicrobial resistance. To achieve this, more holistic surveillance approaches will be required as specified by the Joint Programming Initiative on Antimicrobial Resistance, which has also called for a better understanding of the drivers and burden of antimicrobial resistance and for the development and improvement of affordable, rapid, real time low cost diagnostic tests for different antimicrobial resistance endpoints in environmental monitoring, together with the creation of demonstrators.

At present, the quality, availability and interoperability of the systems used for the surveillance of antimicrobial resistance varies between countries. In addition, most surveillance systems focus on antimicrobial resistance in humans and animals rather than on antimicrobial resistance in the environment. This heterogeneous approach does not meet the needs and expectations of policymakers, public health workers and researchers. Therefore, SI traceable measurement methods to understand how commonly used antibiotics and biocides directly lead to the development of antimicrobial resistance in soils and key aquatic environmental compartments (such as water, sediment and biofilms) need to be developed and validated. Similar methods for key indicators of antimicrobial resistance, such as the profile of the microbiome, the presence of bacteria with antimicrobial resistance, and genetic techniques also need to be developed and validated. The required sensitivity, accuracy and uncertainty need to be determined for each method so that they can be used in risk assessments and in the environmental quantification of antimicrobial resistance.

Little information is available on the contamination of the aquatic environment by chemical stressors such as antibiotics and biocides, and monitoring strategies do not provide sufficient information on their dynamics and environmental fate. In addition, monitoring is usually restricted to water, without consideration of soils, sediments or biofilms, which are recognised sinks of antimicrobial resistance in the environment. Therefore diagnostics tools, and a suitable sampling strategy, need to be designed and implemented to monitor

antimicrobial resistance in soils and aquatic environmental compartments. The costs of such monitoring, display, or early warning systems, based on real-time monitoring diagnostics, will need to be carefully considered as will their metrological validation. Otherwise, this will act as be a barrier to innovation.

In addition, the quality of the environmental data needs to be improved, and the possibility of exchanging data between environmental compartments requires further investigation. There is also a need to create interoperable databases to store the data generated and to understand how this data could be used to control antimicrobial resistance in the environment.

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 metrology supported solutions to understand and control antimicrobial resistance in the environment.

The specific objectives are

1. To develop and validate SI traceable measurement methods to understand how commonly used antibiotics and biocides directly lead to the development of antimicrobial resistance in soils and key aquatic environmental compartments (such as water, sediment and biofilms). The required sensitivity, accuracy and uncertainty should be determined for each method so that it can be used in risk assessments and in the environmental quantification of antimicrobial resistance.
2. To develop and validate SI traceable measurement methods for key indicators of antimicrobial resistance, such as the profile of the microbiome, the presence of bacteria with antimicrobial resistance and genetic techniques. The same environmental compartments should be used as in objective 1. In addition, the required sensitivity, accuracy and uncertainty should be determined for each method as specified in objective 1.
3. To use the findings from objectives 1 and 2 to design and implement diagnostics tools, and a suitable sampling strategy, to monitor antimicrobial resistance in the environmental compartments specified in objective 1.
4. To create interoperable databases to store the data generated in objective 3 and to understand how this data could be used to control antimicrobial resistance in the environment.
5. To facilitate the take up of the technology and measurement infrastructure developed in the project by the measurement supply chain (accredited laboratories), standards developing committees (such as CEN/TC230 or ISO/TC147) and end users (Joint Programming Initiative on Antimicrobial Resistance, Partnership for the Risk Assessment of Chemicals).

These objectives will require large-scale approaches that are beyond the capabilities of single National Metrology Institutes and Designated Institutes. To enhance the impact of the research, the involvement of the appropriate user community such as industry, standardisation and regulatory bodies is strongly recommended, both prior to and during methodology development.

Proposers should establish the current state of the art, and explain how their proposed project goes beyond this. In particular, proposers should outline the achievements of the EMRP project HLT08 INFECT-MET and the EMPIR projects 15HLT01 MetVBadBugs and 15HLT07 AntiMicroResist and how their proposal will build on those.

EURAMET expects the average EU Contribution for the selected JRPs in this TP to be 2.2 M€, and has defined an upper limit of 2.7 M€ for this project.

EURAMET also expects the EU Contribution to the external funded partners to not exceed 35 % of the total EU Contribution across all selected projects in this TP.

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 through appropriate standards bodies,
- Transfer knowledge to the environmental and healthcare 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.