EMPIR Call 2017 – Industry, Fundamental, Normative and Research Potential

Selected Research Topic number: **SRT-i24**
Version: 1.0

Title: European Metrology Cloud - A Digital Quality Infrastructure for innovative products and services in the Digital Single Market

Abstract

Information and communication technologies (ICT) contribute not just to innovation in products, but also allow products to be tracked and counted, thus monitoring waste, losses and costs. In industry there is an ever-increasing drive for efficiency and consumer demand for innovative products and services, thus, in order to eliminate barriers to innovation, and to support product conformity assessment and market surveillance, novel and reliable internet based facilities for the storage of measurement data used in the EU are needed. Such a 'European Metrology Cloud' would also support the successful digital transformation of legal metrology in contemporary technologies such as Cyber-Physical Systems, Internet of Things (IoT) components, Cloud Computing and Big-Data. However, in order to develop this 'European Metrology Cloud' a robust metrological and data quality infrastructure needs to be developed.

Keywords

Digital Single Market, European Metrology Cloud, Legal Metrology Grid, Predictive Maintenance, Condition Monitoring, Embedded Systems, Internet of Things (IoT), Cloud Computing, Smart Services.

Background to the Metrological Challenges

Developing technologies such as the Cloud and the growth of Big Data are currently facilitating rapid changes in the measurement instrument market. The main driver of this change is the increasingly globalised market place, for example products maybe loaded on to ships in India whilst the transaction take place in the Netherlands. The significance of this is that the changes are likely to continue independently of any legal metrology frameworks, as external forces are driving them. Therefore any solutions and frameworks developed must recognise this, and rather than seeking to halt or prevent changes, they must regulate them.

The EC has agreed that enormous economic benefit can be gained from a digital single market and hence it has issued a Digital Single Market Strategy for Europe. This European Strategy aims to set up an efficient infrastructure to support, for example, Cloud Computing which plays a key role through the European Cloud Initiative, the European Free Flow of Data Initiative, and through the emerging issues related to ownership, access, portability of data, and switching of cloud service providers. In turn the 'European Cloud Initiative' aims to strengthen Europe's position in data-driven innovation, improve its competitiveness and cohesion, and help create a Digital Single Market in Europe.

As part of the package of measures for digitising Europe's industry, the EC has outlined a new strategy on Big Data, which supports the transition towards a data-driven economy in Europe. The impact of these measures is also already palpable in areas where innovations are subject to legal control, i.e. the quality and market acceptance of products, including the field of Legal Metrology.

The stakeholders in Legal Metrology consist of the users and manufacturers of the measuring instruments, the national Notified Bodies and the national authorities responsible for Market Surveillance and Verification of the Instruments in the market. The responsibilities and rights of these stakeholders are regulated by European Directives however, there are billions of measuring instruments used on the EU single market; 160 billion in Germany alone. Therefore a digital quality infrastructure for European Legal Metrology that aggregates existing IT infrastructures and databases of stakeholders (i.e. Industry, Notified Bodies and Market Surveillance) towards a Legal Metrology Grid is needed.

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The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

Such a transition from local instruments with distributed hardware to cloud-based virtual software is already supported by the manufacturers' associations in Europe such as WELMEC WG 7 "Software". In addition, digitalisation through a 'European Metrology Cloud' with validated and industrially relevant reference architectures could resolve existing obstacles for innovation within the quality infrastructure set up by Legal Metrology.

Manufacturers often complain that regulations and the current quality infrastructure hamper their use of innovative technologies. However, in the context of Legal Metrology, the question arises as how to assure confidence in the correctness of measurements, as well as ensuring the protection of customers, and the use of technologies at an adequate level. To this end manufacturers and Notified Bodies require technical solutions to meet the legal requirements of the Measuring Instruments Directive (MID) (2014/32/EU), and Market Surveillance authorities require verification procedures, that check product conformity. In response to this the 'European Metrology Cloud' should provide a reliable internet based facility for the storage of data from measuring instruments used in the EU and enable new types of services such as remote verification and diagnostics, condition monitoring, (predictive) maintenance and verification of e-market surveillance and e-compliance.

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 development of metrological capacity for a data quality infrastructure for innovative products and services in the Digital Single Market.

The specific objectives are

1. To design a digital quality infrastructure for European Legal Metrology that aggregates existing IT infrastructures and databases of the partners (Industry, Notified Bodies and Market Surveillance) towards a Legal Metrology Grid. This should include the interconnection of infrastructures and databases to establish a secure "core" platform.
2. To develop validated and industrially relevant reference architectures for novel and complex technologies such as Cyber-Physical Systems, Internet of Things (IoT) components, Cloud Computing and Big-Data. These architectures shall be the key elements of the future European digital quality infrastructure, fulfilling the "essential requirements" of European legislation on Legal Metrology and offering adequate security and easy verification of such technologies, for market surveillance and verification authorities.
3. To develop a novel and reliable internet based facility for the storage of data from measuring instruments used in the EU and to enable new types of services such as remote verification and diagnostics, condition monitoring, (predictive) maintenance and verification of e-market surveillance and e-compliance.
4. To liaise with the Standards Developing Organisations WELMEC and OIML, especially. WELMEC WG 7 and OIML TC5/SC2, in order to contribute to the relevant standards development work and receive active input for the project.

Proposers shall give priority to work that meets documented industrial needs and include measures to support transfer into industry by cooperation and by standardisation. An active involvement of industrial stakeholders is expected in order to align the project with their needs – both through project steering boards and participation in the research activities.

Proposers should establish the current state of the art, and explain how their proposed project goes beyond this.

EURAMET expects the average EU Contribution for the selected JRPs in this TP to be 1.5 M€, and has defined an upper limit of 1.8 M€ for this project.

EURAMET also expects the EU Contribution to the external funded partners to not exceed 30 % of the total EU Contribution to the project.

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 through appropriate standards bodies,
- Transfer knowledge to the ICT sector.

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.