

Met4FoF and SmartCom

Evaluation, communication and provision of metrological information in IoT networks

In general, any network established within the Internet of Things (IoT) provides the capability of communicating data between any kind of associated physical device or data hub. The value of transferred data depends mainly on its quality – expressed for example as a measurement uncertainty – as well as on the ability to be interpreted correctly. For instance, in industrial IoT environments, such as the so-called “Factory of the Future”, data from sensors are the basis for automated decision-making. Hence, the reliability of the decisions depends on the value of the data being used in the analysis. This requires consistent evaluation of data quality and its correct communication and interpretation during all stages of the data life cycle.

Therefore, two European research projects as part of the *European Metrology Programme for Innovation and Research* (EMPIR) with a total EU funding of 3.6 M€ will develop a formal framework for the transmission of metrology data on the basis of the SI and a coherent metrology infrastructure for reliable evaluation and communication of quantitative data and its quality in IoT networks worldwide. These projects are

- **EMPIR 17IND02 SmartCom** – with its central mission to establish a secure, unambiguous and unified exchange of data in all communication networks where metrological data is used.
- **EMPIR 17IND12 Met4FoF** – aiming at the development of a metrological framework for the evaluation of measurement uncertainties for the complete lifecycle of measured data in industrial IoT networks.

The availability of an internationally harmonized evaluation and interpretation of measurement uncertainties has been the foundation for successful global trade and innovative technologies for decades. In the IoT era, though, missing or incomplete metadata, ambiguity and incorrect interpretation and evaluation of data quality represent a significant risk for future investments in IoT technologies. The two EMPIR projects, from June 2018 to May 2021, will mitigate this risk in a joint effort and with an international consortium. The projects will work closely together and are planning to initiate a joint stakeholder advisory board.

The projected early impact of these joint research projects is

- Improved NMI calibration facilities for sensors with digital-only output
- Proof-of-principle “Smart Traceability” sensor communicating data quality in real-time
- Common interfaces for the exchange of metrological data based on SI
- Design and provision of digital calibration certificates to be integrated in file management and cloud systems suitable for automated manufacturing processes.
- Methods for the evaluation of uncertainty in machine learning for industrial IoT
- Selected industrial IoT test beds improved by a consistent metrology infrastructure

In the long term, the outcomes of these projects are expected to speed up the development of new interfaces, standards and metrological guidelines for the fully digitized factory of the future.

Contact

- EMPIR 17IND02 SmartCom: Thomas Wiedenhöfer (Thomas.Wiedenhoefer@ptb.de)
- EMPIR 17IND12 Met4FoF: Sascha Eichstädt (Sascha.Eichstaedt@ptb.de)