Draft preparation of standard documents (inputs to standardization) in collaboration with expert participants in all the WGs.

During its implementation, the COST Action PRIORITY played a pivotal role in advancing harmonization efforts in the field of micro- and nanoplastics. By consolidating best practices, promoting shared terminology, and comparing analytical procedures developed across its Working Groups, the Action fostered greater consistency and mutual understanding among laboratories and research institutions.

In doing so, PRIORITY also helped to clarify and bridge the often-blurred distinction between standardization and harmonization. While formal standardization (e.g., ISO or CEN standards) remains essential, many members highlighted the equally pressing need for accessible, harmonized guidelines and protocols that can be freely adopted and applied — especially in countries where access to official standards is limited. The outcomes of PRIORITY therefore represent valuable inputs and scientific evidence for ongoing and future standardization initiatives within ISO/TC 147/SC 2/JWG 1 – "Plastics (including microplastics) in waters and related matrices" and CEN/TC 444 – "Environmental characterization of solid matrices."

Capacity Building and Training Foundations

To strengthen the Action's contribution to harmonization and pre-standardization, PRIORITY organized two dedicated training events:

- Training School "Basic Concepts of Metrology and Standardization" – Ljubljana, Slovenia (16 April 2024)
- Workshop "Current and future metrology and chemometrics in microplastic research" – Ljubljana, Slovenia (25 March 2025)

These schools provided participants with theoretical and practical skills to apply metrological principles (traceability, uncertainty, validation, interlaboratory comparability) to microplastic measurements.

Both events featured contributions from leading experts in metrology and related regulatory frameworks, fostering a direct and continuous dialogue between PRIORITY and the international standardization community.

A third edition of the school is already scheduled(5 February 2026, Ljubljana, Slovenia), ensuring continuity of this educational activity beyond the lifetime of PRIORITY and demonstrating the sustainability of the network's efforts in training and capacity building.

Scientific Foundation and Contributions to Standardization

A central technical output underpinning PRIORITY's contribution to harmonization and standardization is the review:

Rani M. et al., "A Complete Guide to Extraction Methods of Microplastics from Complex Environmental Matrices," Molecules 2023, 28(15), 5710. (https://www.mdpi.com/1420-3049/28/15/5710).

This paper was conceptualized and written by the leaders of WG2, in collaboration with other members holding key leadership roles within the Action. It provides a systematic review of more than 150 published extraction methods, identifies critical procedural steps and limitations, and proposes a harmonized decision-making framework for selecting protocols according to matrix type and analytical objective. It thus represents a scientific input document that can directly support future standardization or guideline efforts by ISO, CEN, or other pre-normative bodies, serving as a foundation for harmonized sample preparation workflows and performance criteria.

Inputs and Ongoing Efforts Relevant to Standardization

Building upon the expertise developed through these activities, PRIORITY produced/is producing several types of contributions that can inform or support future pre-normative documents and standardization work:

- ✓ *Interlaboratory Study (ILS) Design and Evaluation*

A perspective paper, currently under submission, was developed jointly with the PlasticTrace project (https://plastictrace.eu/), building on the results of a survey conducted among all PRIORITY participants. The survey mapped past and ongoing interlaboratory studies (ILS) and collected valuable insights and suggestions for the design of future exercises.

This work integrates the viewpoints of metrological institutes and research laboratories to outline shared principles for the planning, statistical evaluation, and reporting of ILS in the field of micro- and nanoplastic analysis.

The initiative directly supports the need for traceability and comparability of measurement results and is fully aligned with the objectives of CEN/TC 444 and ISO/TC 147 discussions, providing a bridge between metrological rigor and practical implementation in research laboratories.

- ✓ *Harmonized Vocabulary and Terminology*

Throughout all meetings, training schools, and round tables, PRIORITY continuously promoted the use of a common vocabulary, harmonizing definitions of particle size classes, polymer identification, and measurement principles in accordance with ISO/TR 21960. This harmonization effort represents one of the most impactful outcomes of the Action, improving communication and consistency across disciplines and countries.

- ✓ *Future Directions – Good Laboratory Practices and QA/QC Guidelines*

The importance of contamination control, blank management, and quality assurance in micro- and nanoplastic analysis was frequently discussed within the network. These discussions may evolve into a future guidance document or CEN Workshop Agreement, building upon the collaborative framework established by PRIORITY.

Integration with International Standardization Activities

Some PRIORITY experts actively participate in ISO/TC 147/SC 2/JWG 1, ensuring that knowledge generated through the Action contributes directly to ongoing international standardization processes.

Moreover, joint activities with PlasticTrace — including the Stakeholder Workshop (12 December 2024) and the SETAC Europe 2025 satellite event (Vienna, 12 May 2025) — further reinforced this bridge between the research and metrology communities.

Through these collaborations, PRIORITY has become a recognized platform connecting scientists, standardizers, and metrologists, ensuring that future standards and guidelines for micro- and nanoplastics analysis will be scientifically sound, inclusive, and practically applicable.

Engagement with European Standardization and Research Initiatives

In addition to collaborations with PlasticTrace, PRIORITY also contributed to the PlasticsFatE Expert Stakeholder World Café held at DECHEMA, Frankfurt (29 November 2023).

This event, organised within the CUSP cluster of Horizon 2020 projects, brought together key stakeholders from research, metrology, regulation, and industry to discuss the analytical, toxicological, and design dimensions of micro- and nanoplastics.

Through the participation of its representatives, PRIORITY provided expert input on analytics and standardization, particularly addressing the need for harmonized sampling, processing, and detection methods for MNPs, as well as the challenges and time constraints affecting the standardization process.

PRIORITY's involvement in this high-level consultation strengthened its liaison with European initiatives such as PlasticsFatE and PlasticTrace, enhancing the network's role as a bridge between scientific communities, metrology institutes, and policy-oriented projects.

The dialogue also contributed to aligning PRIORITY's outputs—such as its harmonized terminology, extraction method review, and interlaboratory study work—with the broader EU effort to inform future standards and regulatory strategies on micro- and nanoplastics.

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