

Report on the involvement of stakeholders, including private and public laboratories, equipment manufacturers, environmental protection agencies, NGOs, food producers and consumers associations, cosmetics and pharmaceutical industries, national and international standardization bodies and metrological institutes, European RTDs, the overall scientific community and decision-makers

1. Introduction

This report details the involvement of various stakeholders, including the scientific community, industry, metrological institutes, and policy-makers, in the context of micro- and nanoplastics (MNP) research activities described in the sources, particularly focusing on the COST Action PRIORITY (CA20101). The content of this report is based on evidence collected through the Action's networking tools—such as meetings, Working Group activities, Short-Term Scientific Missions, Training Schools, workshops, and participation in round-table discussions—as well as outputs from collaborative initiatives across the network.

In addition, PRIORITY designated a dedicated Stakeholder Engagement Coordinator, who systematically worked to map relevant external actors and potential partners, ensuring that all categories of stakeholders were identified, involved, and integrated into the Action's activities whenever possible.

2. Stakeholder Categories and Involvement Overview

To capture the breadth of engagement achieved during the four years of COST Action PRIORITY, a structured overview of stakeholders was developed.

The table 1 provides a synthetic mapping of the main stakeholder categories involved in the Action, summarizing:

- Who they are (type of stakeholder)
- How they contributed (involvement in activities, collaborations, events, technical input)

Table 1 — Overview of Stakeholder Involvement in PRIORITY

Stakeholder Category	Evidence of Involvement
Scientific community & RTDs	560+ experts, 53+ countries, 77 STSMs, Training Schools, WGs
Public & private laboratories	STSM hosts, ILS participation, advanced analytical labs
Equipment manufacturers	Required instrumentation identified (AFM-IR, nano-Raman, LDIR), <i>ad hoc</i> invitations in PRIORITY events
National & international standardization bodies	ISO, CEN, VAMAS, input to normative documents
Metrology Institutes (NMIs)	INRiM, BAM, JRC collaborations, PlasticTrace project
Decision-makers & EPAs	COST Connect, JRC interaction, regulatory discussions
NGOs	Citizen science, community outreach
Food sector & consumers	MNP in seafood, fibers in food preparation, educational outreach
Cosmetics & pharma	Polystyrene upcycling to pharmaceuticals, industry project links

2.1 The Overall Scientific Community and European RTDs (Research and Technological Development)

The scientific community and European RTD institutions form the foundational structure of the activities described in the sources.

- **Breadth and Scale:** The COST Action PRIORITY network includes **more than 560 experts from over 53 countries**. These participants are invited to contribute their experiences, methodologies, challenges, and future needs.

- **Research Institutions:** Approximately 90% of Interlaboratory Study (ILS) Survey participants identified themselves as **researchers or professors** from **public and private Universities and Research centers**.
- **Mapping EU Research:** A Virtual Mobility (VM) initiative mapped ongoing and completed EU research projects related to MNP (funded by programs like H2020 and HorizonEurope). The initial database included **54 ongoing or completed projects** with **244 collaborating institutions** (totaling 344 entries due to multiple participations). The resulting map covered **280 institutions worldwide** involved in MNP research.
- **Collaboration and Capacity Building:** Networks like PRIORITY are central catalysts for fostering **interdisciplinary collaboration** among chemists, toxicologists, epidemiologists, and engineers. They support training schools, workshops, and fellowships to strengthen the next generation of researchers. Furthermore, the network facilitates **high overall accessibility** to research infrastructures through Short-Term Scientific Missions (STSMs) across Europe and globally.

2.2 Private and Public Laboratories and Equipment Manufacturers

Public and private laboratories are deeply engaged as participants and hosts for research activities, including interlaboratory comparisons (ILCs) and the use of specialized infrastructure.

- **Infrastructure Accessibility:** PRIORITY members have access to a diverse set of research infrastructures, including advanced analytical laboratories (e.g., FTIR, Raman, Py-GC/MS) and toxicology facilities, upon availability of PRIORITY members to host mobilities.
- **Equipment Needs:** The ability of laboratories to participate is often restricted by limited access to **necessary instrumentation and adequate funding**. Approximately 55% of ILS survey participants would benefit from **access to advanced equipment** for MNP detection and analysis. This highlights the central role of **equipment manufacturers** in developing and supplying the required **high-resolution, high-sensitivity equipment** (e.g., AFM-IR, nano-Raman, single-particle ICP-MS).

2.3 National and International Standardization Bodies and Metrological Institutes

This group is a key focus for PRIORITY, especially Working Group 6 (WG6), which acts as a bridge between research and standardization.

- **Liaison Bodies:** PRIORITY maintains strong connections with institutions such as **ISO** (specifically ISO/TC 147/SC 2/JWG 1) and the **European Committee for Standardization (CEN)** (specifically TC 444).

- **Metrology Collaboration:** PRIORITY has organized Round Tables with representatives of **National Metrology Institutes (NMIs)**, including **INRiM** (Italian National Metrology Institute) and **BAM** (Federal Institute for Materials Research and Testing).
- **Joint Projects:** There is a strong collaborative relationship with the **PlasticTrace project** (a Euramet-funded initiative). This collaboration led to a joint perspective paper on the design of ILS from both metrological institute and research laboratory viewpoints.
- **Pre-Normative Research:** Core Group Members are involved in **VAMAS** (Versailles Project on Advanced Materials and Standards), promoting consensus-based approaches that support future international standards.
- **Harmonization Input:** PRIORITY provides **valuable inputs and scientific evidence** for standardization initiatives by consolidating best practices, reviewing extraction methods, and promoting **harmonized vocabulary and terminology**. NMIs and standardization bodies are actively aided by PRIORITY in the development of standardized procedures and technical reports.

2.4 Decision-Makers and Environmental Protection Agencies (EPAs)

Stakeholders in regulatory and policy areas are engaged to translate scientific findings into actionable policy and regulation.

- **Policy Translation:** PRIORITY views its role as central to bridging science and policy, providing expert advice and scientific input to **European and national decision-makers**.
- **European Commission:** PRIORITY contributed to policy-oriented dialogue by participating in the COST Connect event organized jointly by the COST Association and the **Joint Research Centre (JRC)**. The JRC, alongside BAM, has previously organized proficiency tests related to microplastics.
- **Regulatory Alignment:** PRIORITY participation in CEN workshops and liaison with organizations like PlasticsFatE ensures coherence between ongoing research and the evolving **regulatory landscape**.
- **Mitigation Strategies:** Policy and prevention measures proposed by experts include reducing single-use plastics, introducing legislative actions, and incentivizing eco-design and safer polymer formulations. WG5 specifically plans a position paper on the application of **Directive 2018/852**.

2.5 NGOs, Food Producers, and Consumers Associations

Engagement with society, education, and consumer interests is managed primarily through Working Group 7 (WG7), and through policy-oriented consultations.

- **NGOs and Citizen Science:** PRIORITY enhances engagement with **NGOs** and promotes **public education campaigns**. WG7 activities include fostering **citizen science**, and the development of pilots focusing on consumer-relevant issues with citizen science-based activities like **tumble dryer fibers** and **bioplastics in compost**.
- **Consumers and Food Safety:** Topics related to consumer health and exposure, such as microplastic ingestion in **commercial crustacean species** (linking marine pollution to **food safety**) and avoidance of microplastics from **foods**, are discussed within the network.
- **Outreach and Education:** WG7 published an article in *Frontiers for Young Minds* to engage and inspire young audiences, translating the related experiment protocol into **12 languages** to broaden accessibility.
- **Consultation:** The **PlasticsFatE Expert Stakeholder Workshop** involved consultation with **NGOs and consumers**.

2.6 Cosmetics and Pharmaceutical Industries

Direct, formal representation is less detailed than for metrology or policy bodies, but industrial involvement is noted, particularly concerning research and database expansion.

- **Industry Collaboration:** Collaboration has begun with **PlasticsEurope** (Brussels) to enhance the database of EU projects by including **industry funded projects**. PlasticsEurope have been attending and presenting in many PRIORITY events, keeping and growing a strong connection with the members.
- **R&D Representation: Industry R&D** representatives are members of PRIORITY WGs, actively attending PRIORITY events.
- **Pharmaceutical Focus (Indirect):** Research activities related to **pharmaceuticals** are implied through WG5 discussions, which included photochemical upcycling processes of polystyrene plastics for the synthesis of pharmaceuticals.

3. Conclusions

The involvement across these diverse stakeholders is orchestrated by the PRIORITY COST Action network to ensure that scientific findings are **harmonized, translated into policy advice, and communicated effectively to society**. The goal is to build a cohesive framework for advancing the understanding and mitigation of micro- and nanoplastic pollution.