Integrated Approach for Exposure and Health Effects Monitoring of Engineered Nanomaterials in Workplaces and Urban Areas

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NanoExplore (left panel)

Preparatory Stage
Selection of a representative cohort of workers:
A well-designed cohort study will be developed for examining the applicability of candidate biomarkers.

Implementation Stage
Validation of biomarkers:
Proposed biomarkers will be analysed depending of the type of ENMs and exposure levels, being validated on the basis of the variability of the effects observed with respect to the control subjects.

Monitoring Stage
Demonstration in case studies:
Candidate biomarkers will be applied in subjects exposed to ENMs.

Objectives

NanoExplore aims to develop and demonstrate the feasibility of an **integrated approach to conduct biomonitoring studies, characterize exposure levels and elucidate possible health effects deriving from exposure to engineered nanomaterials (ENM)** in indoor workplaces and urban areas.

- Developing a **wireless sensor network** of low-cost, portable and battery-powered devices that monitor the concentration of ENMs and relevant physical environmental conditions in indoor workplaces and urban area
- Defining and validating **panel of candidate biomarkers** of nanomaterial exposure and effects via inhalation
- Developing a **web-based data management tool** aimed at supporting health surveillance and the acquisition, management and processing of data on the concentration of ENMs

Methodological approach - Biomarkers

Stage 1 Selection of strategic locations:
3 measurement areas from industrial facilities & 2 locations from urban areas
Different climate regions and changes over one year

Stage 2 Validation of wireless sensor network:
Applicability of the system to support long-term measurements
Characterisation of potential damages of the environmental enclosure

Stage 3 Software validation:
Definition of performance criteria and measurable indicators to evaluate the benefits, shortcomings and limitations of the tool
Robustness of the system including alarm errors and continuity of the provided monitoring data

Methodological approach – Wireless sensor network and web based tool

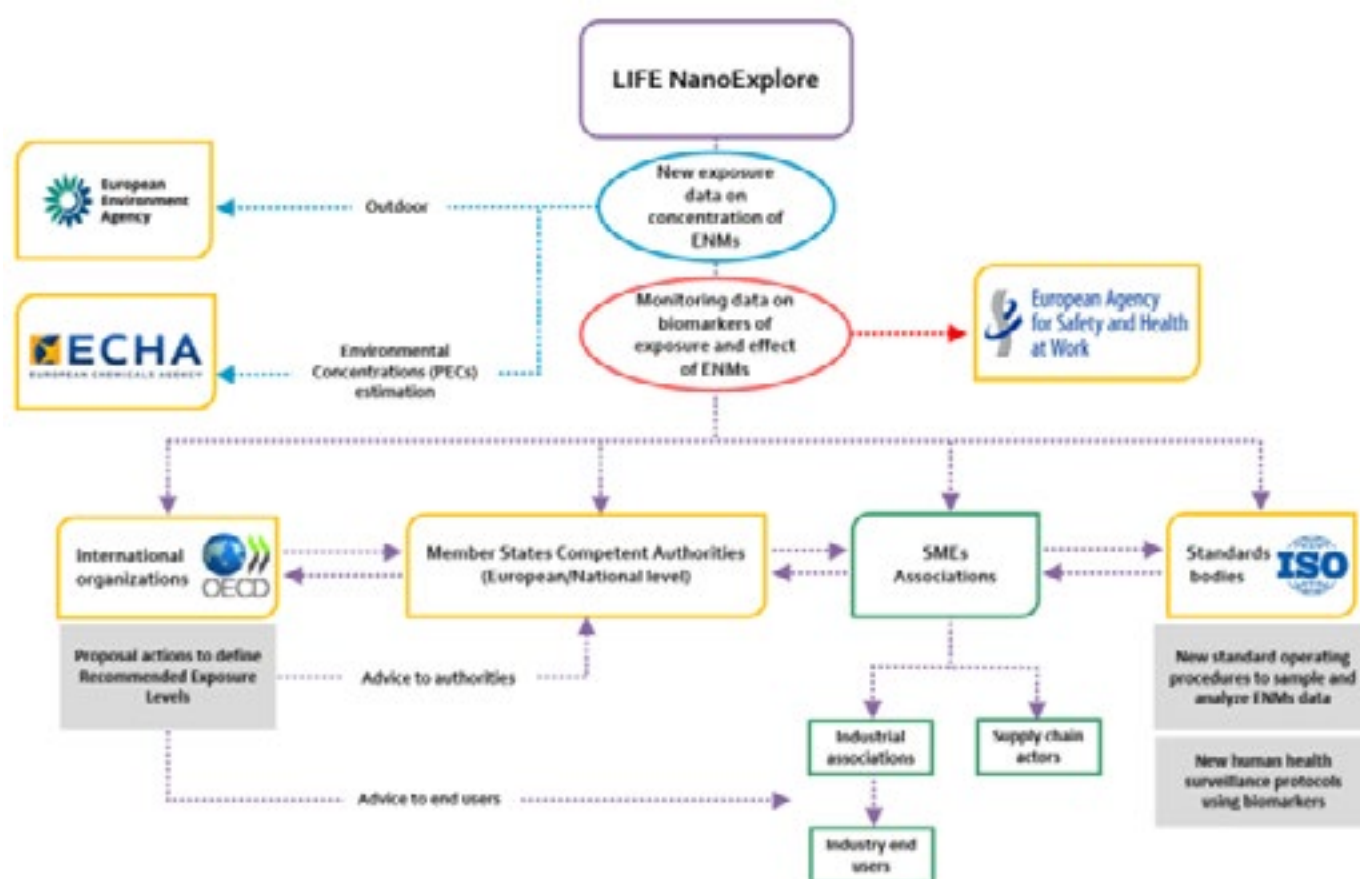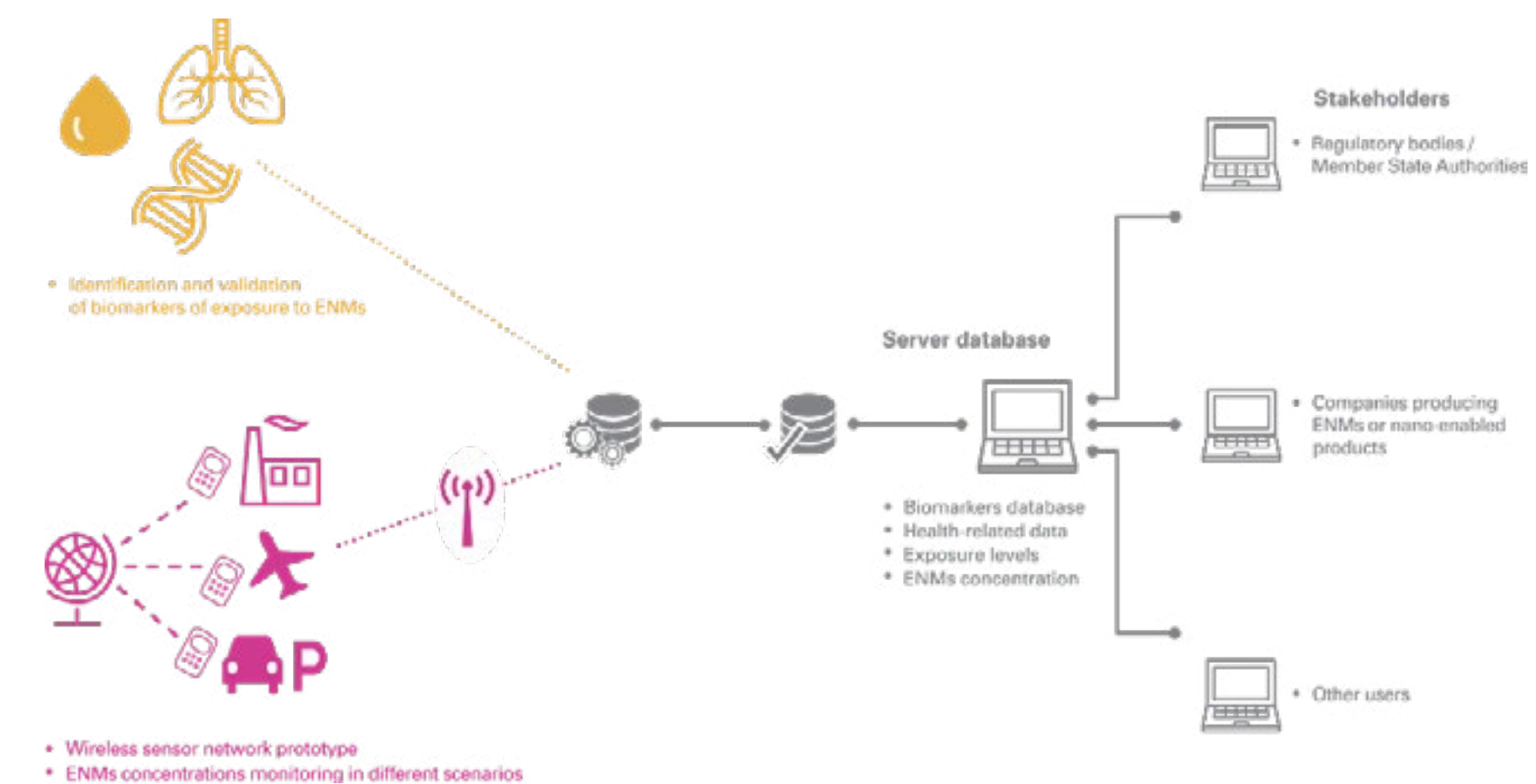**Stage 1 Selection of a representative cohort of workers:**
Examination of the applicability of candidate biomarkers
Up to 100 workers/over 1 year
Selection and categorization of workers into cohorts by their exposure status, including control (unexposed group) and exposed workers

Stage 2 Validation of biomarkers:
Analysis of biomarkers depending on the type of ENMs, exposure levels and on the variability of the effects in comparison to the control

Stage 3 Demonstration in case studies:
Application of biomarkers in subjects exposed to ENMs (Production, DS uses at industrial scale, research companies, airports and underground parking)

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