



nanoMONITOR

Potential exposure to engineered nanomaterials in workplaces



Javier Pla
Nanosafety Group- ITENE
Javier.pla@itene.com

Introduction



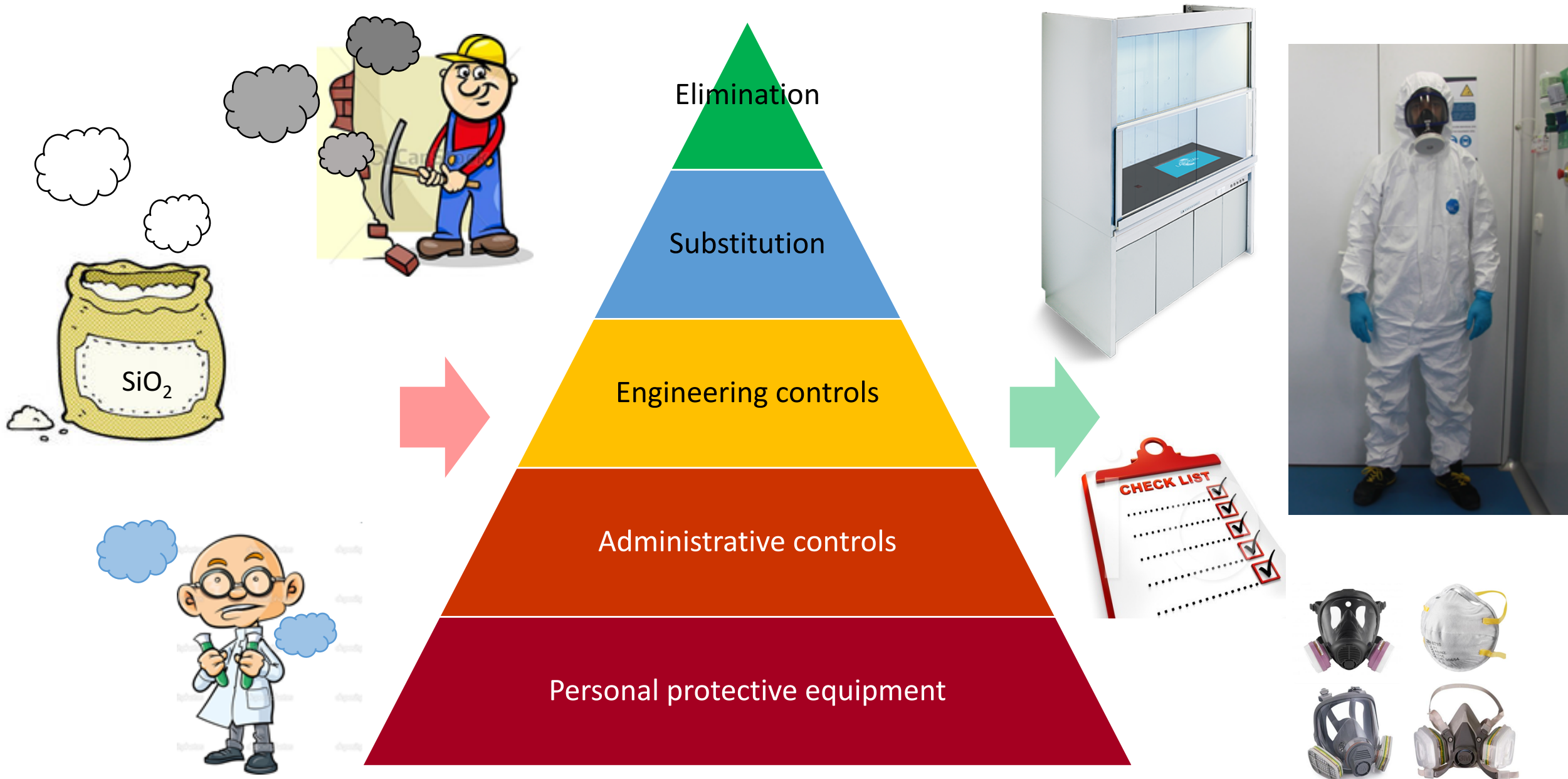
Nanotechnology has experienced a tremendous growth during last years, promoting the development of a new generation of products in most major industry sectors.



Engineered nanomaterials raise many questions and generate concerns about their potential effects on the human health owing to their physical, chemical and biological properties, which differ significantly from larger sized bulk materials, even when the basic material is the same



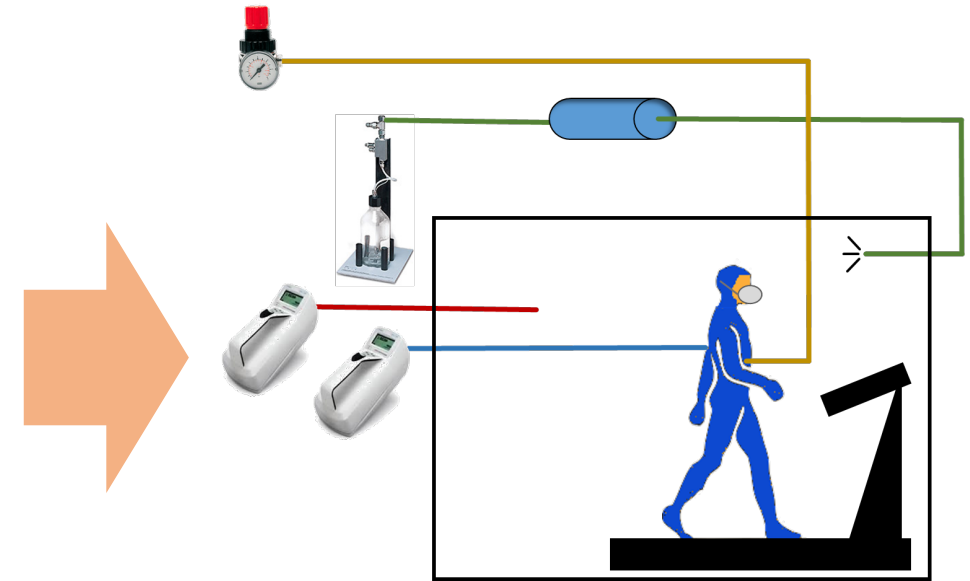
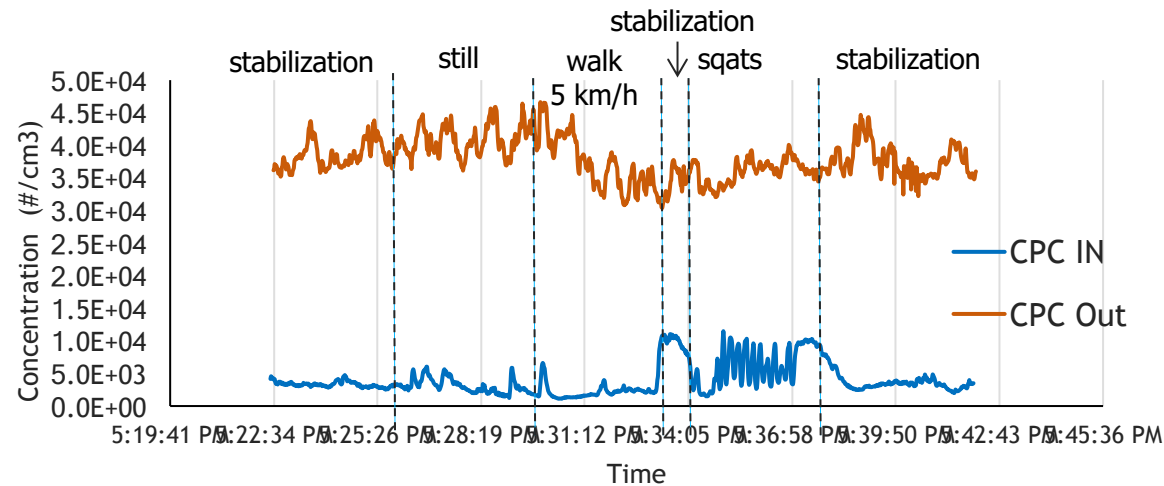
Hierarchy of risk management measures



Efficiency of personal protective equipment against ENMs

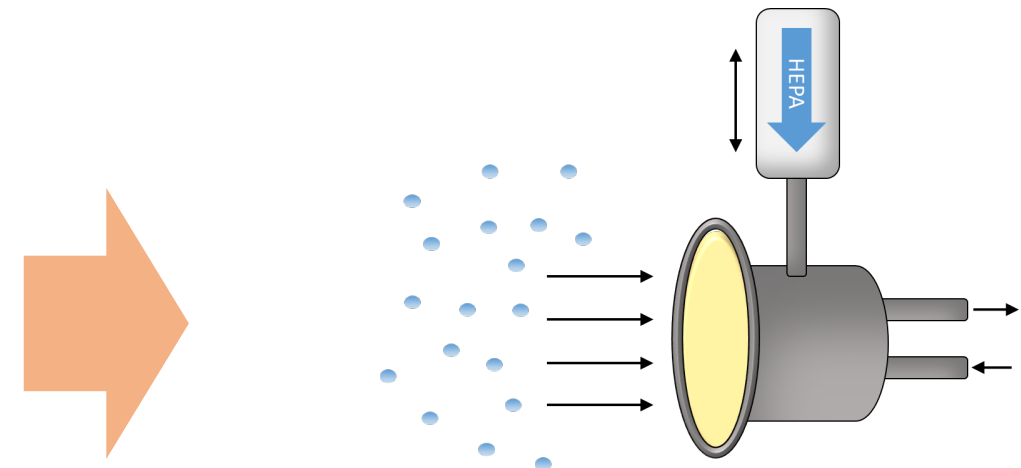
Protective clothing

- ✓ Sudden movements enhance the inward leakage due to the gaps of the suit with the body
- ✓ For dry MNMs, recommended non woven suits such as type 5



Chemical Protective Gloves

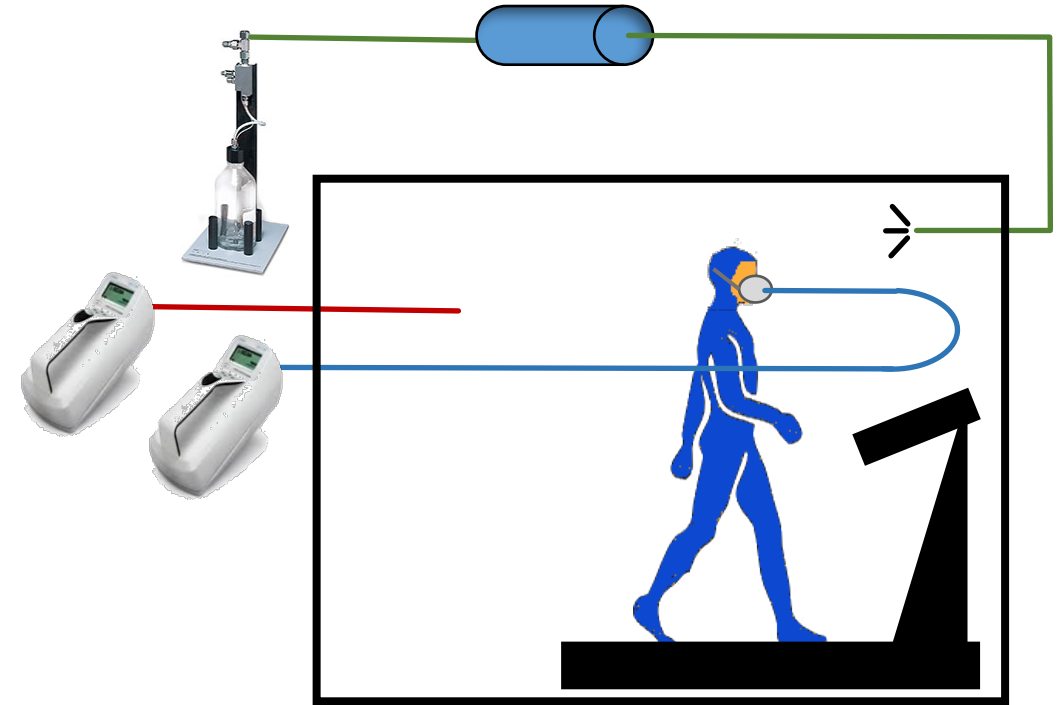
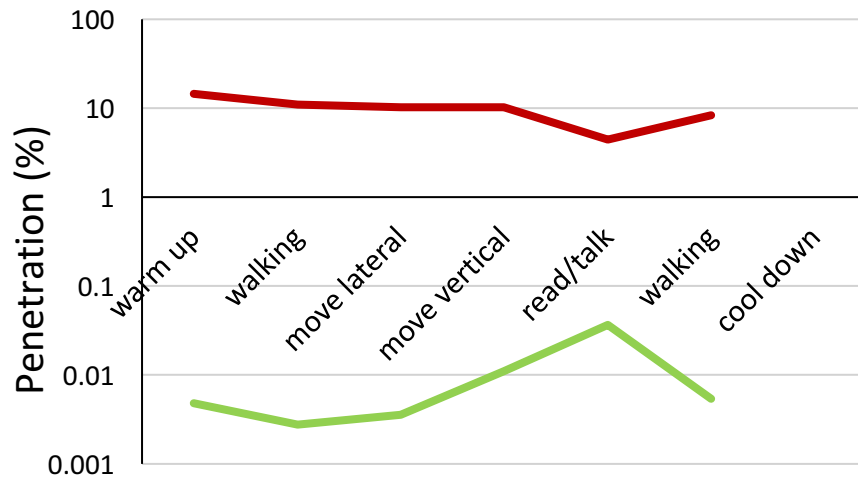
- ✓ Choose chemical protective gloves. If they are very thin, opt for a double glove.
- ✓ Special protective clothing must be applied to the glove if solvents are used as dispersing agents.
- ✓ Regular change of gloves to minimize imperfections due to use and hand movements.



Efficiency of personal protective equipment against ENMs

Respiratory protection

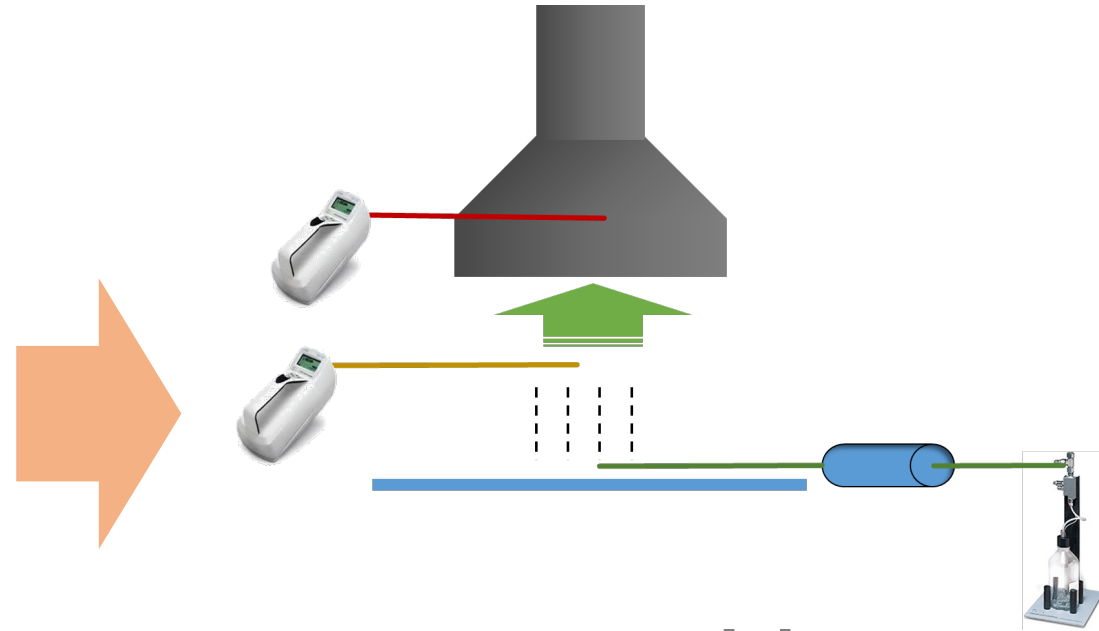
- ✓ Fitting of the RPE to the shape of the user's face is the main issue to consider for reducing exposure by inhalation.
- ✓ Manufacturers have defined new innovations to improve the facial seal, including the use of adhesive material and improvements in the design of trim strips (straps).



Efficiency of engineering controls against ENMs

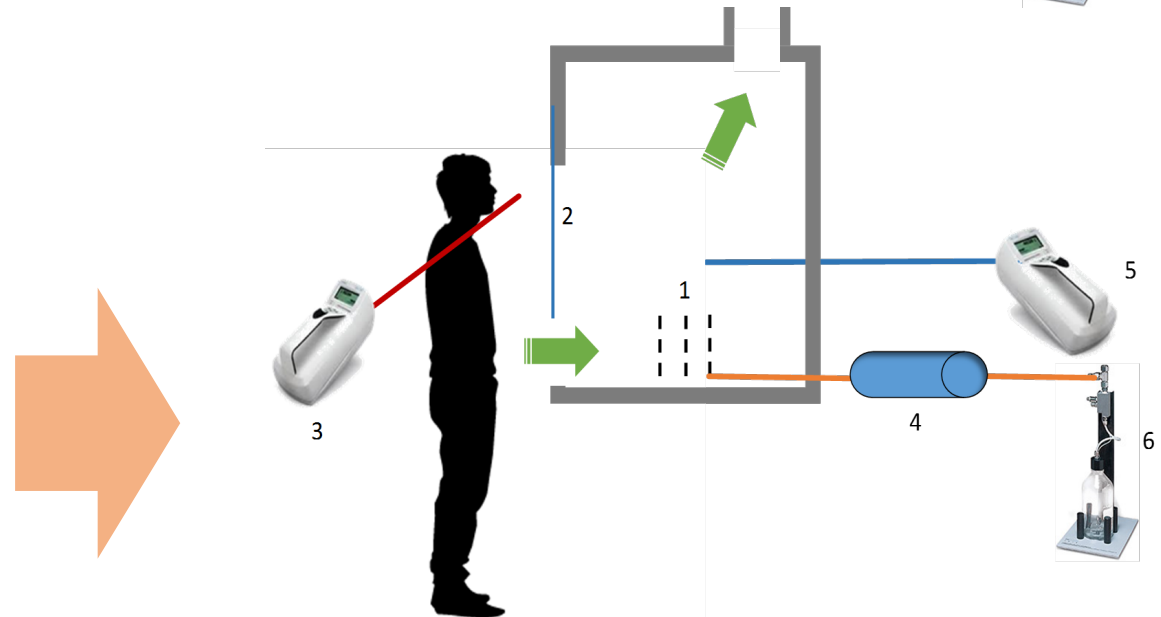
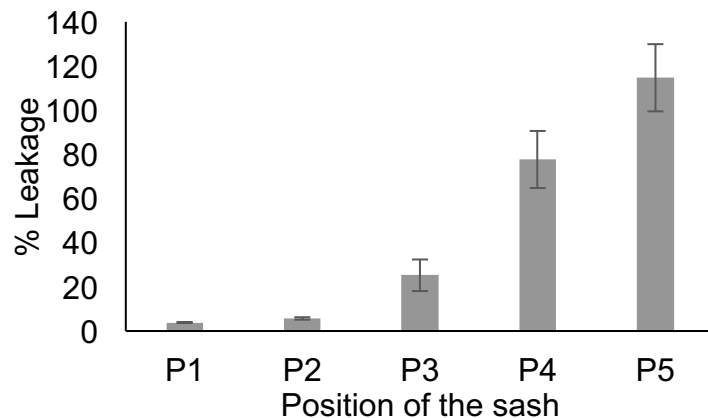
Movable Capture Hoods

Better capture efficiency when tilted than perpendicular to the source



Fume Hoods

The efficiency decreases when the sash is opened
Divided by areas, some offer more exposure

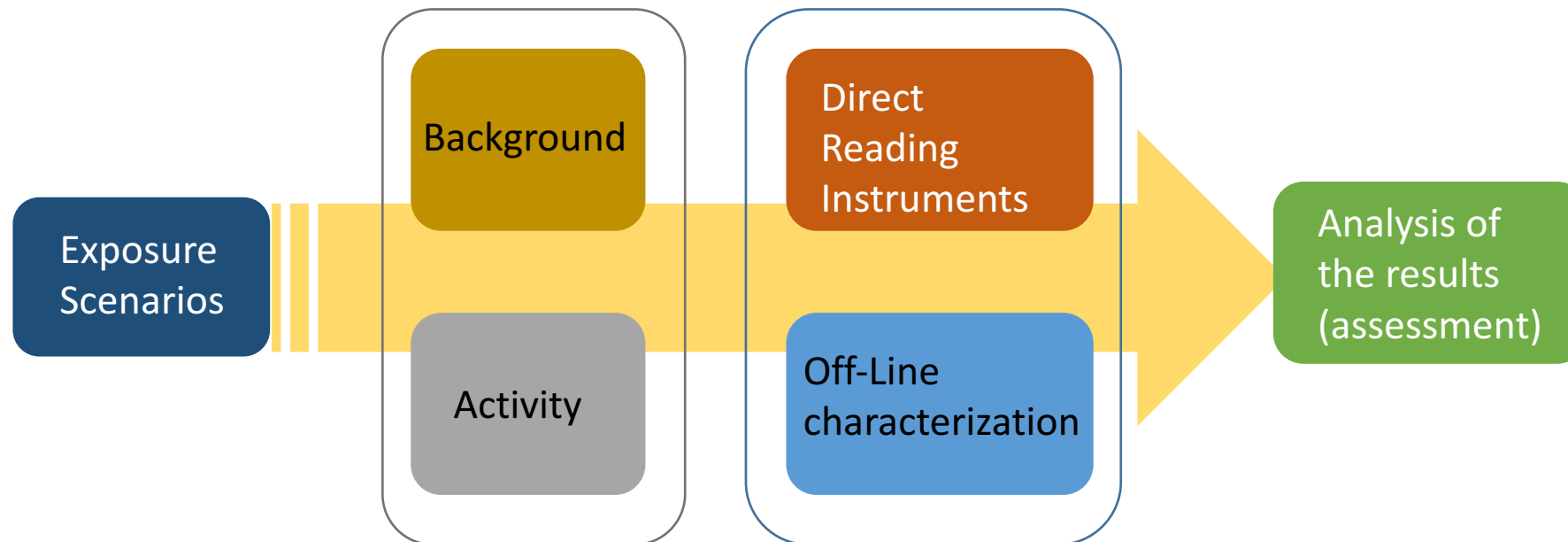


Risk Assessment for Nanoparticles



The NEAT employs a combination of direct-reading, handheld instruments to detect releases of airborne nanomaterial coupled with filter-based air sampling and subsequent chemical and microscopic analyses for particle identification and chemical speciation

NEAT: Nanoparticle Exposure Assessment Technique



Instrumentation available to measure NPs



Condensation
Particle Counter
(CPC)



Optical Particle
Sizer (OPS)



NanoTracer



Aerodynamic Particle Sizer (APS)



DiscMINI



Filters and personal
sampling pump



Scanning Mobility
Particle Sizer (SMPS)



Fast Mobility Particle
Sizer (FMPS)



Electrical Low Pressure
Impactor (ELPI+)



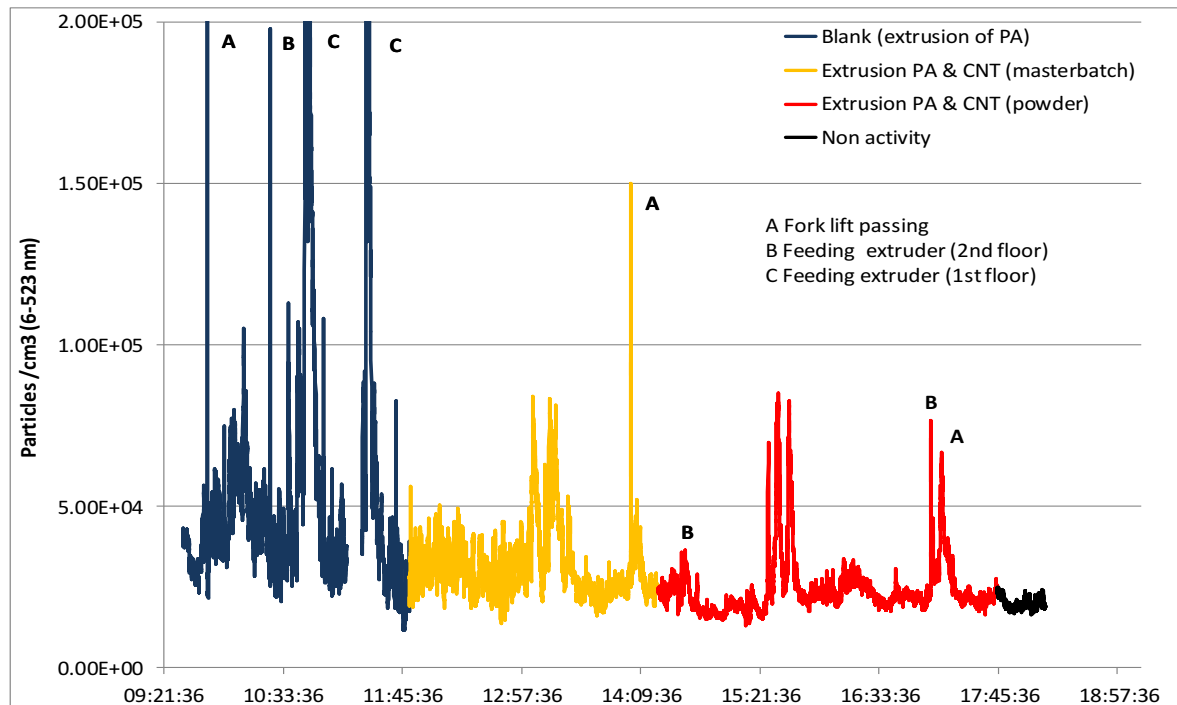
117 Nanoscan

Some examples from real case studies

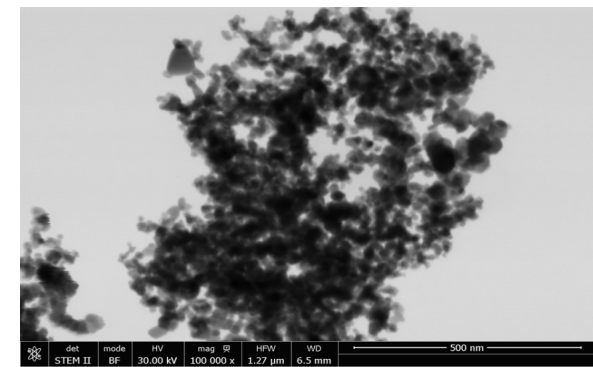
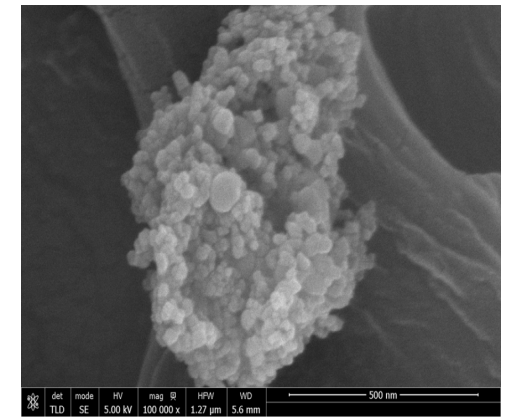
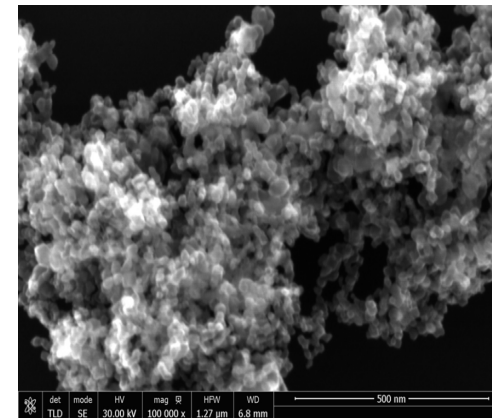
Example of application of the NEAT approach in a real environment



Direct-Reading instrument

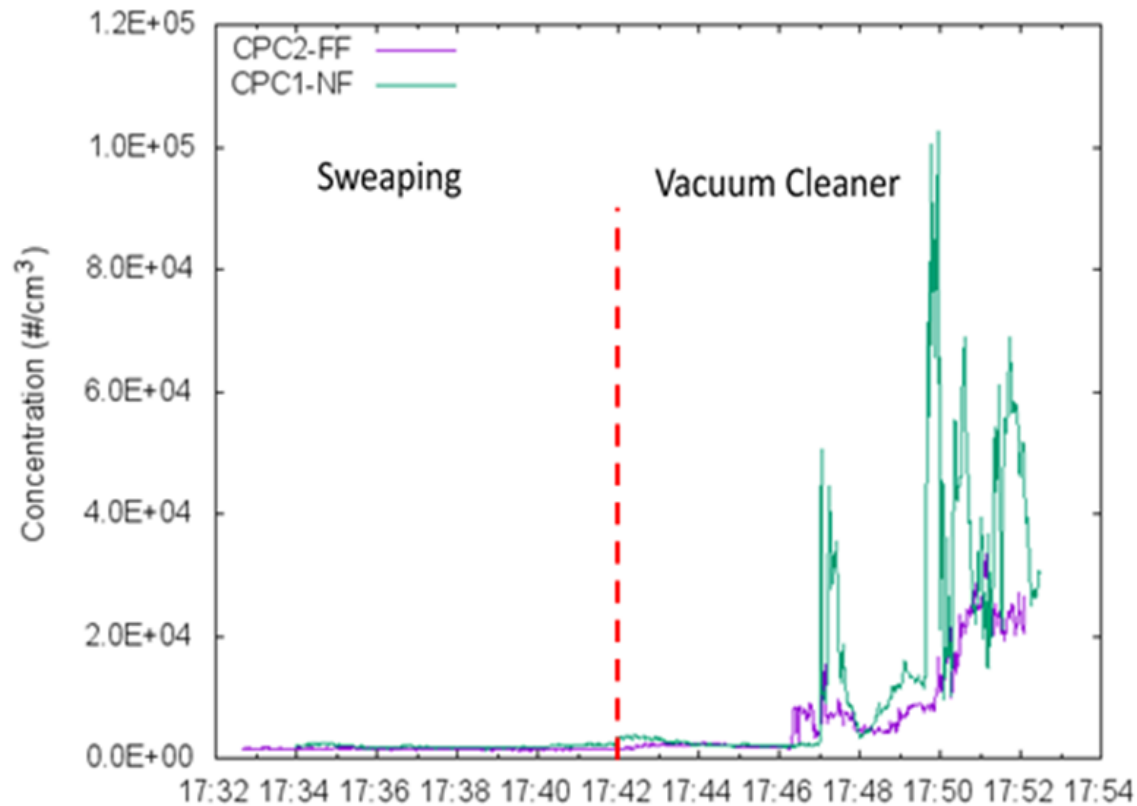


Filter-based air sampling and subsequent chemical and microscopic analyses for particle identification

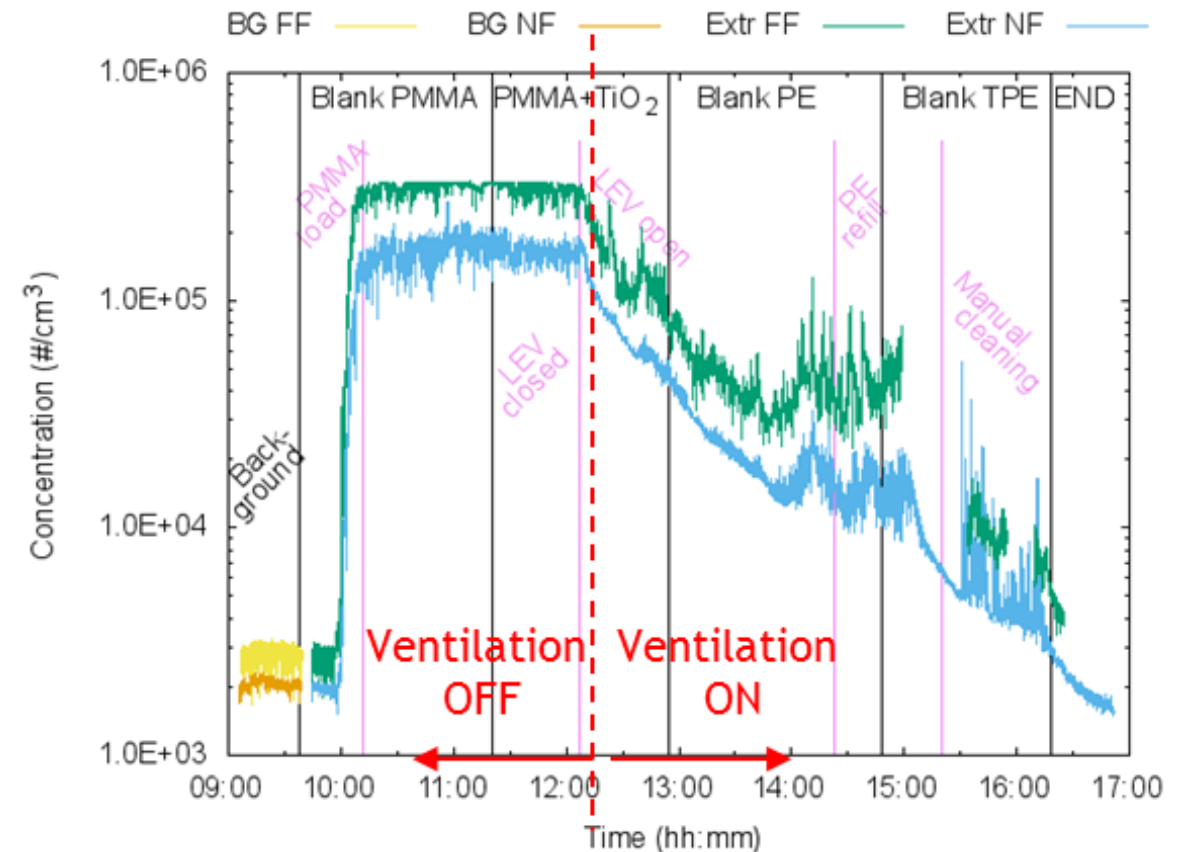
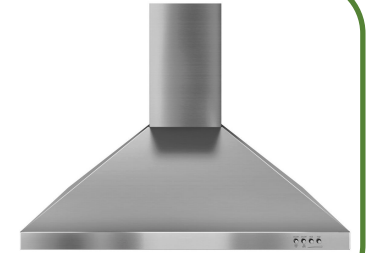


Some examples from real case studies

Cleaning the working zone of an emprise which produces ENMs

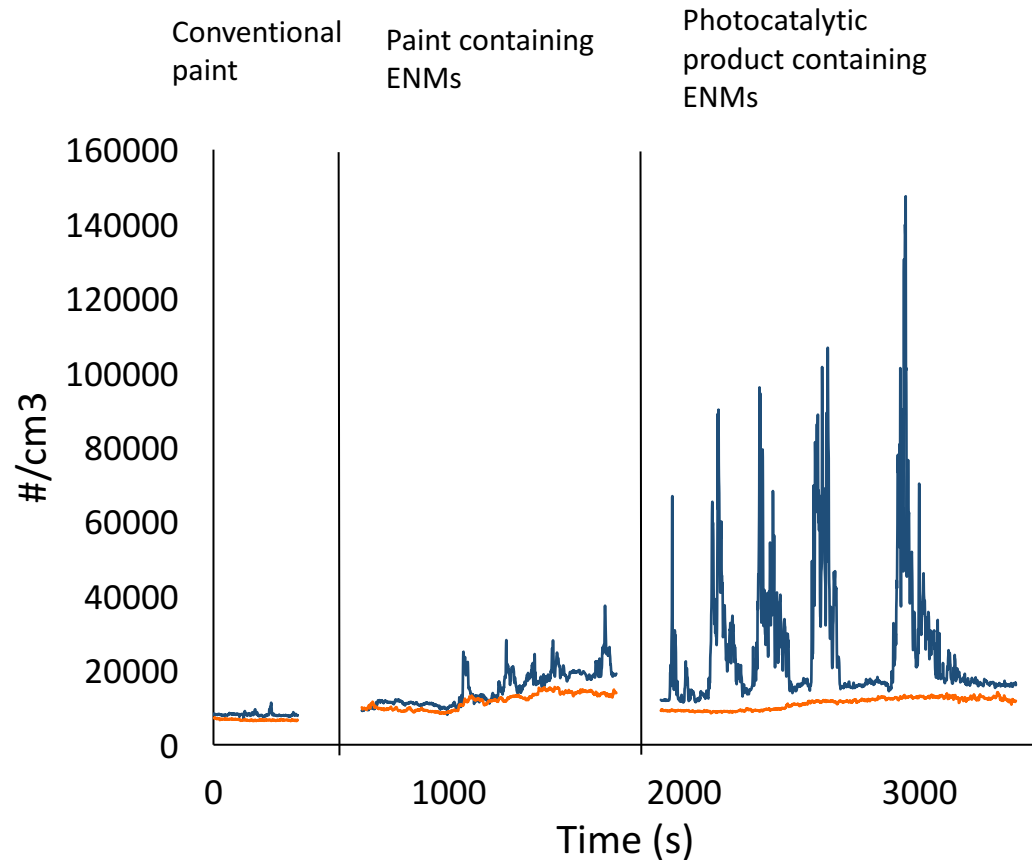


Variation of the concentration of ENMs as function of the ventilation system

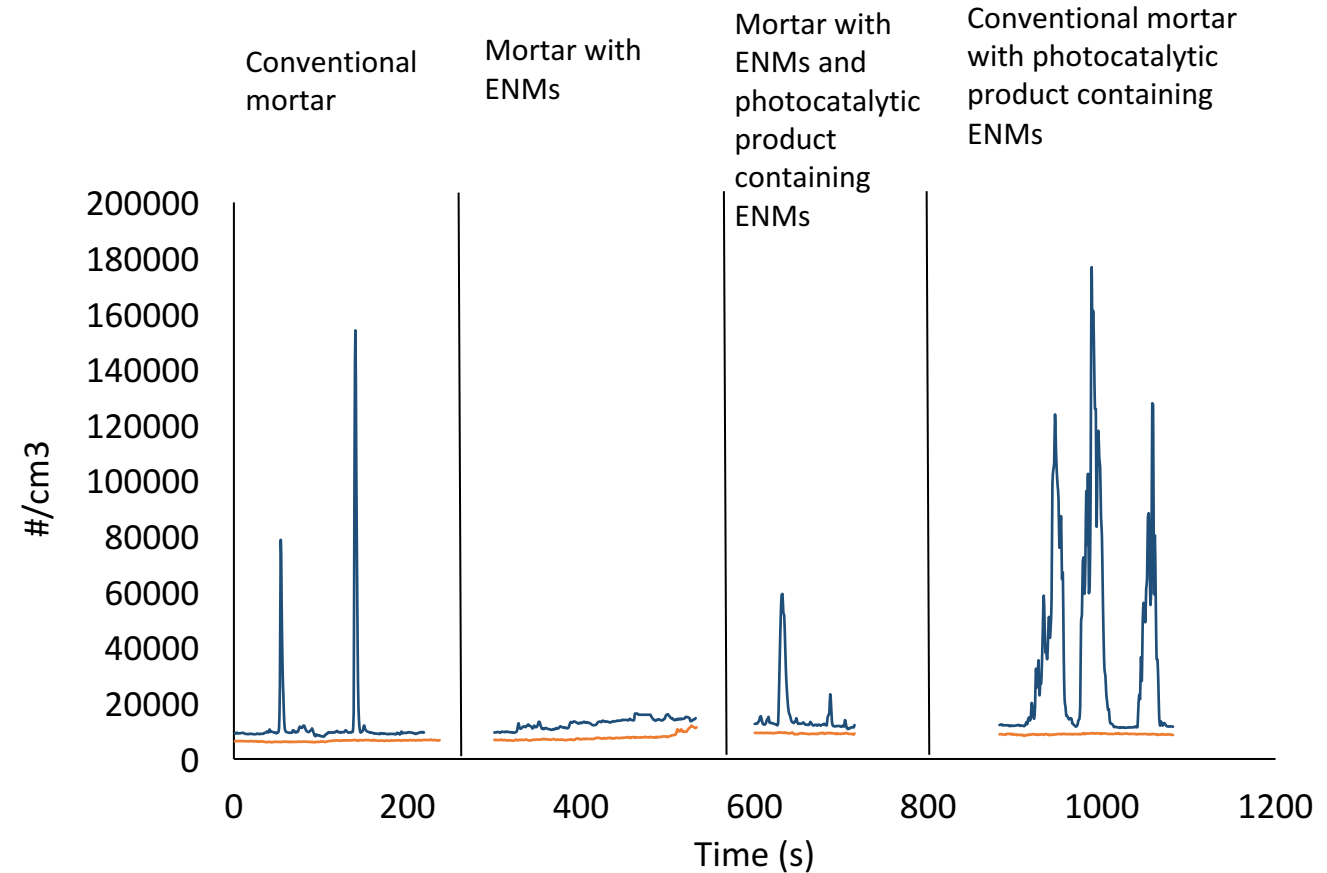


Some examples from real case studies

Spraying distinct products



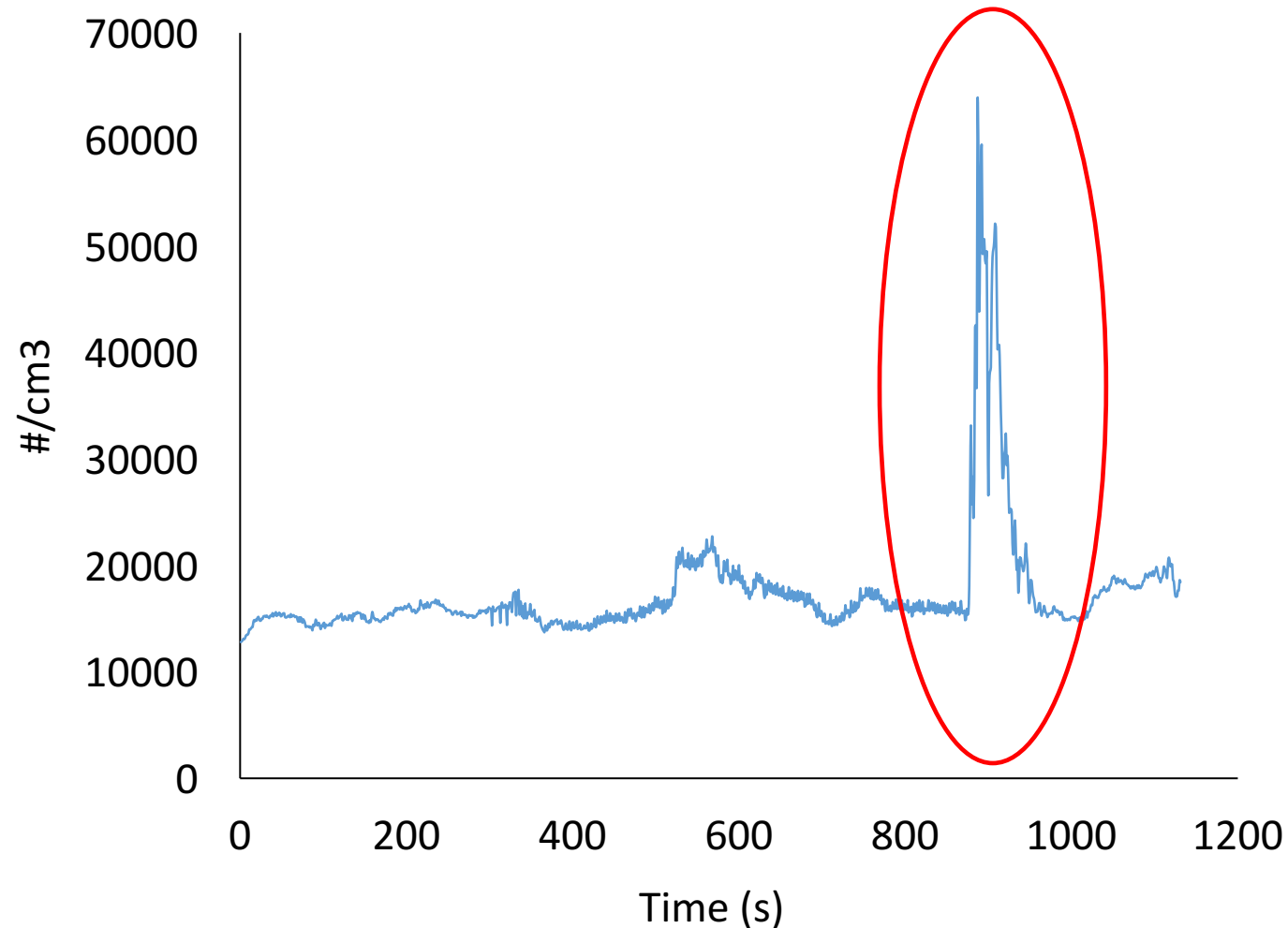
Sanding different surfaces



Some examples from real case studies

Nanoparticles are not only present in the workplace

Measurement of the outdoor background

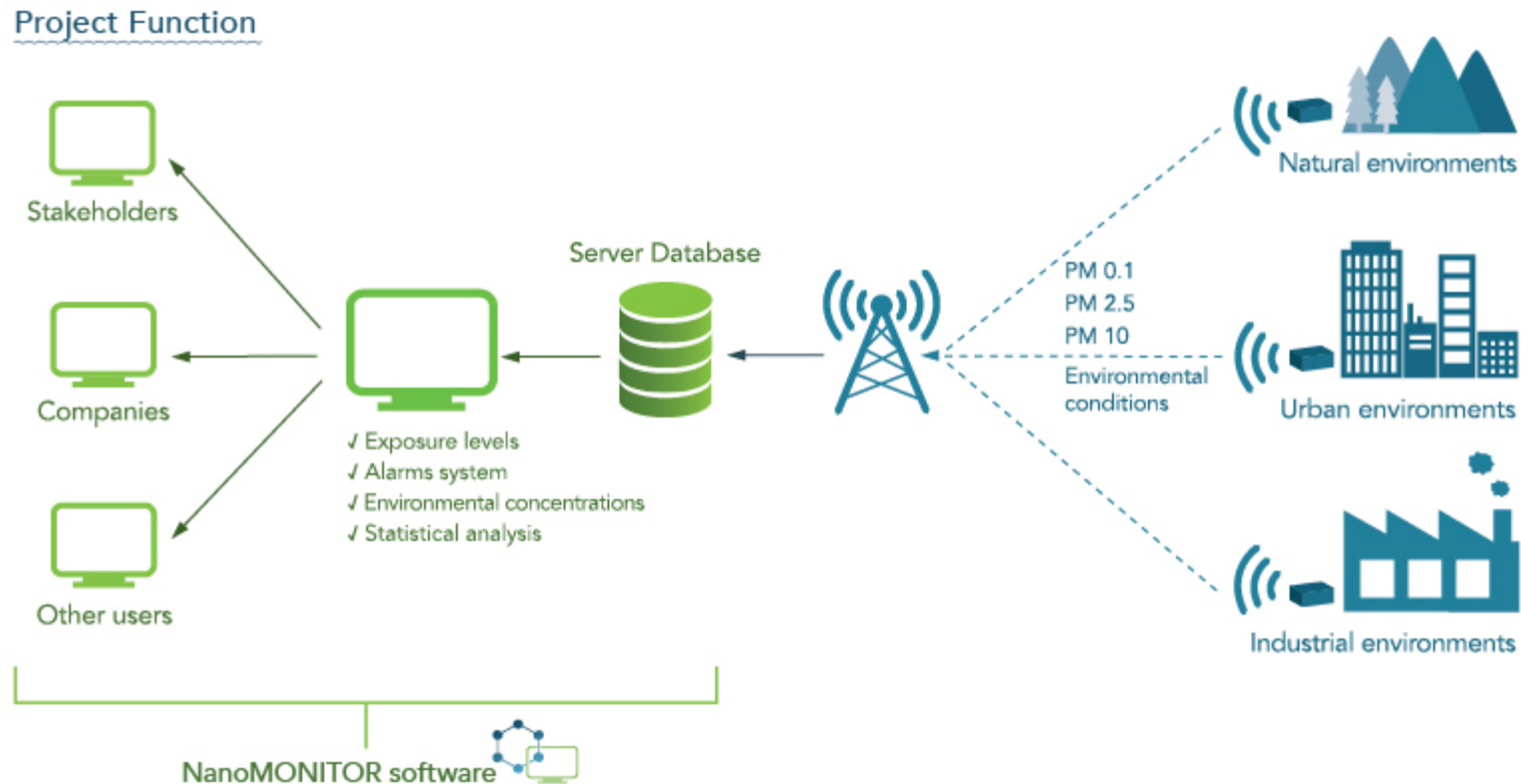


What happened?!?!



Compilation of exposure scenarios

All the exposure scenarios measured in the distinct campaigns will be compiled in the NanoMonitor database in order to offer useful information about the release of nanomaterials in different activities.



Conclusions

- ✓ Nanomaterials can be generated in a wide range of activities.
- ✓ In general, personal protective equipment and engineering controls achieve good levels of protection against nanomaterials.
- ✓ The most critical factor to take into account is the fitting of the personal protective equipment to the body of the worker.
- ✓ In Spain in particular, there are no specific Professional Exposure limits for nanomaterials, while at the international level some countries begin to define them.
- ✓ Different EU and worldwide projects have published various guides to support the risk assessment of nanomaterials, including definitions of accepted test methods, however, the applicability of the methods is under continuous review.



Thanks for your

