



Best practices effectiveness, prevention and protection measures for
control of risk posed by engineered nanomaterials

Publicly Available Report

Coordinator of the Project
ITENE

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Executive Summary

LIFE NanoRISK project has been focused in the generation of data related to the efficiency of current Risk Management Measures (RMM), including personal protective equipment, as well as engineering controls such as local exhaust ventilation (LEV) against nanomaterials, due they are a key factor to assure a high level of protection of the human health and the environment.

A good design of the engineering controls is a key factor to minimize the environmental release and the exposure in the workplace. However, these controls must be complemented by good practices and by the use of personal protective equipment, especially when the elimination, substitution or the application of other measures has not been possible.

Results obtained during the project may be summarized as follows:

- Development of a test chamber prototype to carry out the standardised assessment about the efficiency of the working procedures, as well as the preventive and protective actions to control the risk posed by nanomaterials
- An interactive library about risk management measures and personal protective equipment to control and reduce the risk posed by the exposition to nanomaterials.
- A multimedia guidance about the recommended measures focused to minimize and control the risk related to the exposition to nanomaterials.

These results have been monitored and disseminated amongst their target audience in order to quantify the impact and diffusion of the project. The actions carried out to achieve this are presented in the following.

1. Main Outcomes in 2016

The last actions summarized in this document are focused on the implementation, monitoring and diffusion of the results obtained during the life of the NanoRISK project. It covers the actions developed in the yellow fraction highlighted in Figure 1.

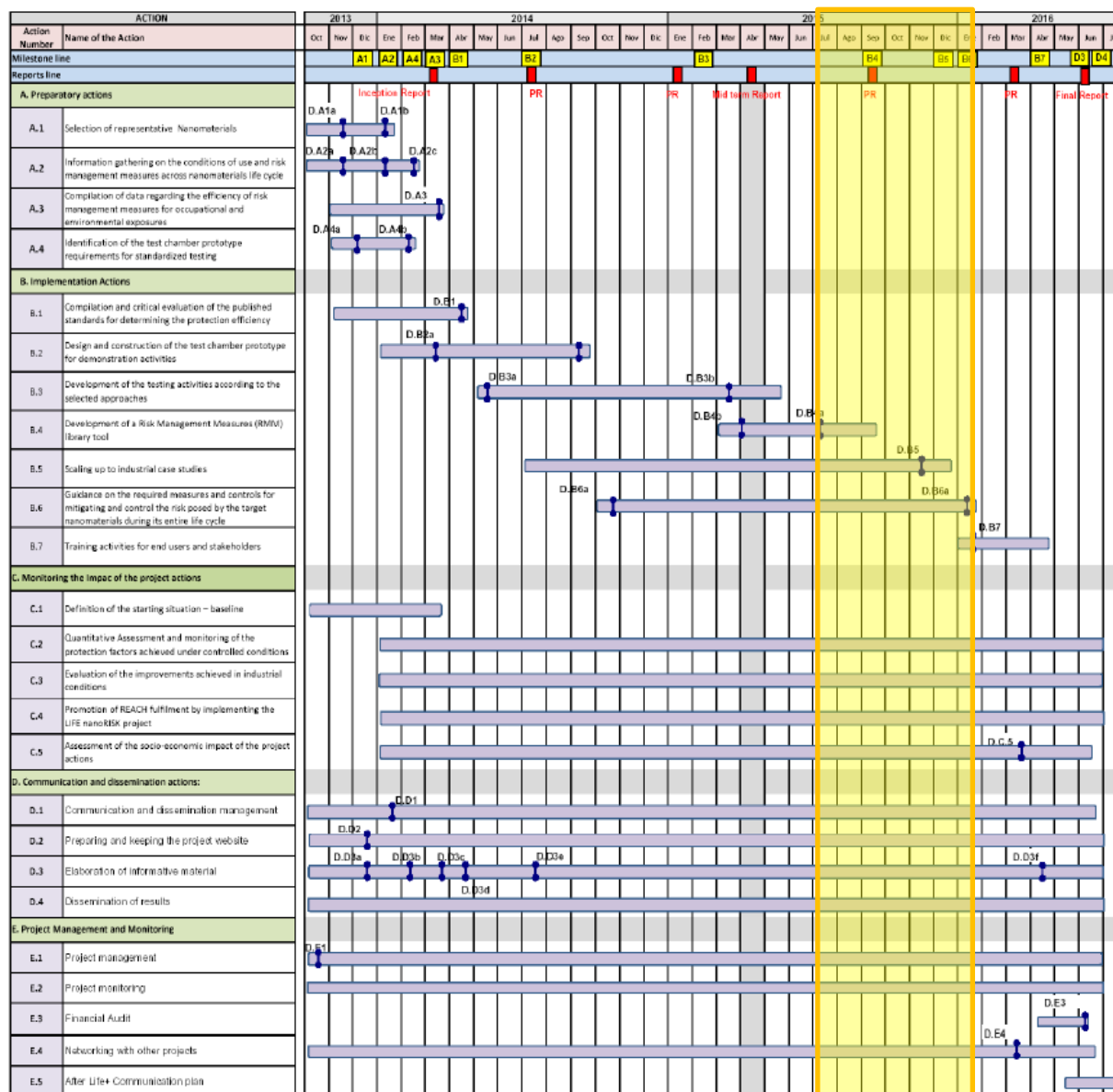


Figure 1: Activities covered within this report from the time Schedule of the Project.

Action B5. Scaling up to industrial case studies

The objective of this action is to implement the RMMs evaluated within B3 in a compendium of case studies representing the life cycle stages and critical exposure scenarios identified in occupational settings.

The scaling up stage was divided into four main stages, including 1) the **implementation** of selected personal protective equipment, technical measures and administrative controls in 5 case studies, 2) the **evaluation of effectiveness** of relevant measures during critical operations with the aim of evaluate in situ the average reduction of the levels on exposure in the workplace, 3) the **validation** of the applicability of selected measures in terms of average reduction and costs, and 4) the **definition of a list of 10 priority measures** to achieve a reduction of the exposure and release of ENMs.

The overall reduction achieved in each case study after the implementation phase is depicted in Figure 2. An **average reduction of 20.7 %** was achieved after implemented the measures recommended on the basis of the effectiveness measured in the nanoaerosol exposure chamber.

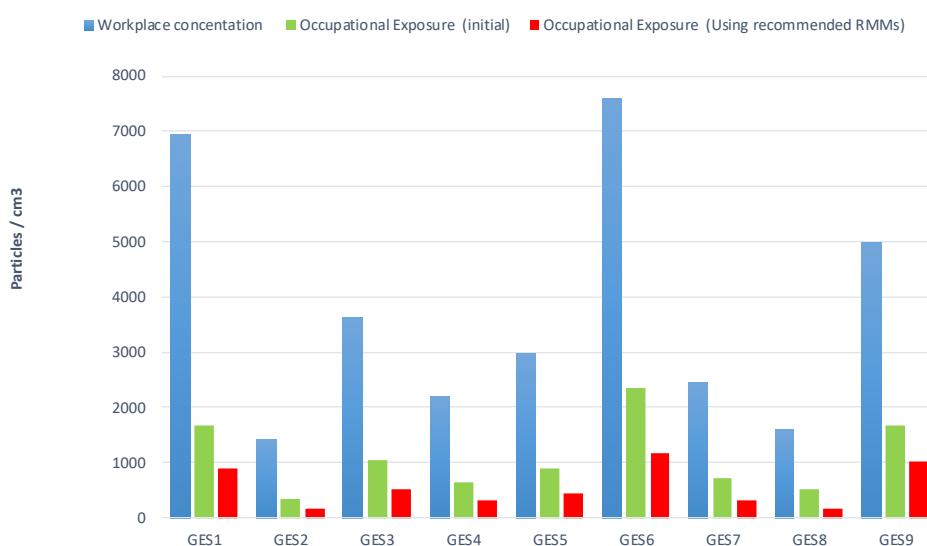


Figure 2. Exposure reduction using common risk management measures

Concerning the validation of the operability tools developed, questionnaires were distributed to the target audience to gather data on their opinion. The data show a more than 70 % of the companies are satisfied with the outcomes of the project, especially when asking about the performance of the guidance on recommended measures. It shall be noted that the data revealed the need of provide additional information on the use of the RMM library, which is mainly due to the need for interpretation of the input values used to support the calculation of efficiency values.

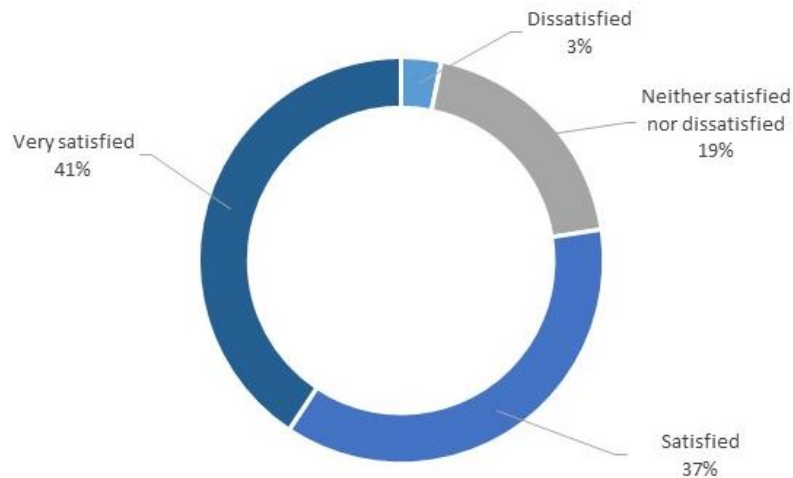


Figure 3. Overall Evaluation of the tools developed

Action B6. Guidance on the required measures and controls

After the development of the contents of the Guidance on the use of RMMs in the nanocomposite industry, the last action within the task B6 works on the redaction of the guide on the basis of the structure and contents defined, considering always the use of non-academic language, and including clear explanations of the conditions of use of each measure.

The guide is developed in two main formats; one is a simple .pdf file of the guide of easy access into the download section of the project web site. The other format developed is an interactive guide, which will increase the operability of the guide, including navigation buttons, cross-references, photos, videos and periodical updates (http://www.wilsonagencia.com/itene/ITE-CAT_INTER_PAGINAS_v3.swf). The interactive guidance will be developed by means of dedicated software, mainly Frame Maker® and Adobe InDesign CS6®, including at least the following functions:

- Navigation buttons to browse through chapters or view the contents or index
- Master page to easily jump to the contents of the guide
- Executable videos
- Interactive HTML
- Save As menu for comments or annotations of the user
- Compatibility for reading devices, including eBooks and mobile phones (App versions for iPhone, iPad, Android or Windows mobile)
- Interactive step-by- step decision tree for RMM selection
- Help Page

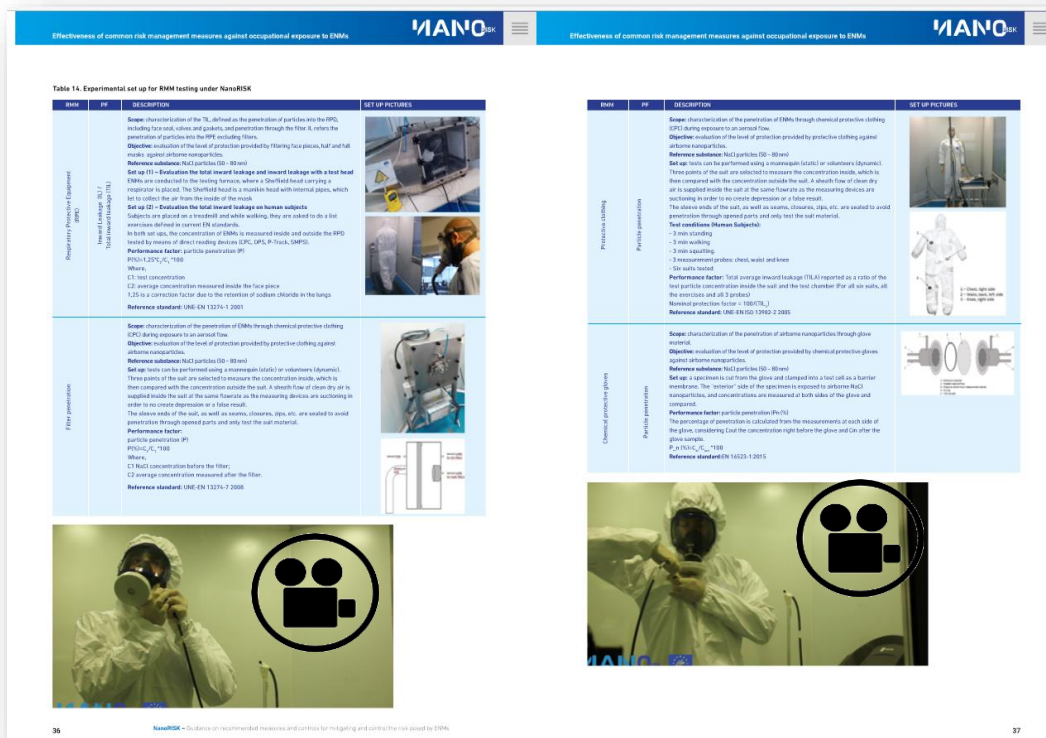


Figure 4: Screenshots of the interactive document functionalities.

Action B7. Training activities for end users and stakeholders

With the aim of transferring the outcomes of the project to relevant stakeholders, including workers and professional users who use ENMs as such, in mixtures or incorporated into articles in research or production processes, health and safety advisors, occupational hygienists, experts from industry associations, and experts from standardization (i.e. ISO committees) and/or regulatory bodies, training activities were organized.

Three main activities were conducted, including the design and development of a compendium of training materials based on the outcomes of the project and the needs of the industry and the organization of training sessions.

The training materials developed included power point presentations, on-line webinars and videos designed to support the control and mitigation of the exposure to ENMs in the workplace, all available under the project web site.

Concerning the training sessions, a total of 96 persons attended, including representative persons from academia, industry and public bodies. The list of attendees to the sessions have been included in the annex section. The e-learning platform has been included in the web site of the project, containing the training materials and webinars carried out within the task. The program of the workshops and pictures published in social media are shown in

Figure 5.

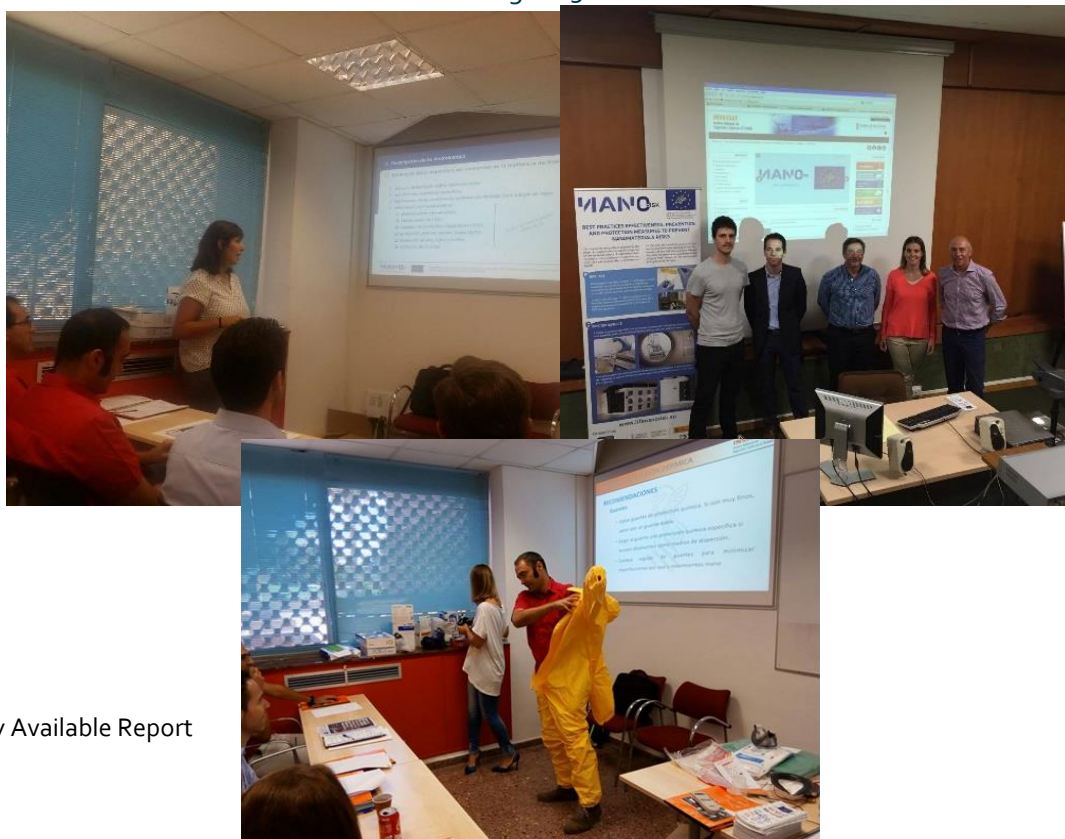


Figure 5. Pictures during training sessions in Alicante (left and center) and Castellon (right).

Actions C. Monitoring of the impact of the project actions

The actions of monitoring are intended to be carried out during the total length of the project in order to monitor the impact and diffusion of the project on their target audience. They are divided into:

- Definition of the starting situation – baseline: to define the starting situation in relation with the use of risk management measures when dealing with nanomaterials, considering the effectiveness of the current measures employed at all the stages of nanomaterials life cycle (synthesis, processing, use, recycling and their disposal).
- Quantitative Assessment and monitoring of the protection factors achieved under controlled conditions: to identify the improvement in the protection factors achieved by means of the combinations of the risk management measures studied in the project. To this end, the outcomes from the testing activities are recorded and studied in detail to quantify level of improvement in the reduction of the exposure and release (Figure 6).

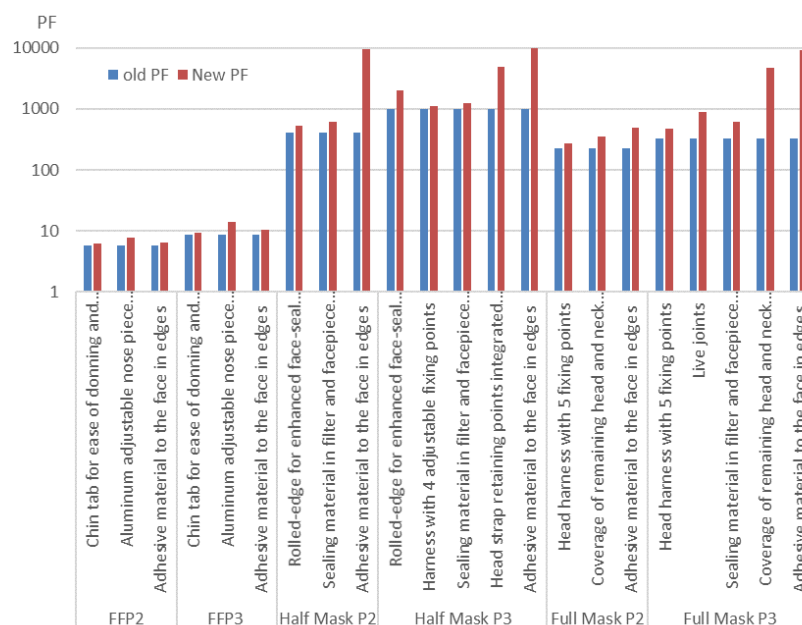


Figure 6: Graphical representation of the improvement in protection factors of PPEs with improved designs.

Evaluation of the improvements achieved in industrial conditions: to evaluate the reduction in exposure due to the implementation of the selected risk management measures by the industrial partners, voluntary case studies and those other parties following the recommendations established in the newly developed guidance. To this end, a monitoring plan will be established to quantify the improvements reached on the basis of the starting situation defined in previous actions (Figure 7).

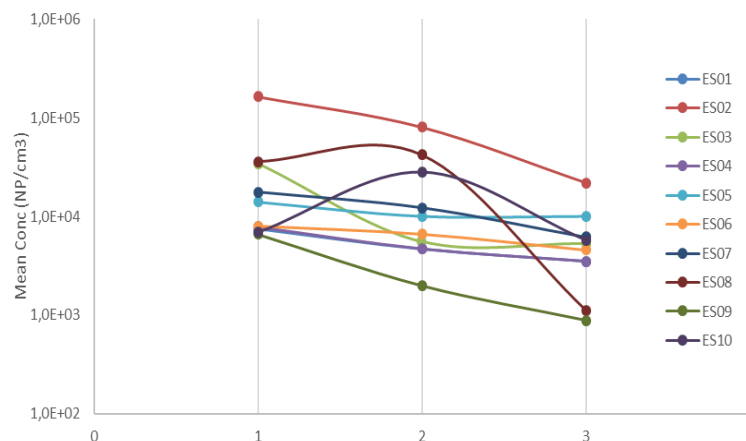


Figure 7: Particle number concentration reduction in the successive campaigns for each Exposure Scenario.

- Promotion of REACH fulfilment by implementing the LIFE NanoRISK project: to evaluate the suitability of the actions conducted within the project to support the implementation of REACH and the enhancement of knowledge on the risk assessment of nanomaterials, considering as key issue the promotion of the REACH fulfilment.
- Assessment of the socio-economic impact of the project actions: a set of socioeconomic indicators have been developed in order to measure the impact of the project to the local economy and population. The conclusion extracted from these indicators will be collected and explained in socio-economic impact report that will be delivered with the final report.

Actions D. Communication and dissemination actions

Communication is important not only to inform about how are EU funds spent, but also to raise awareness about how this project helps social, political and economic actors to implement environmental legislation. Dissemination of NanoRISK outputs also will help to guarantee the durability of the project's results.

Figure 8: Screenshot of the web page of the NanoRISK project with the informative video and the guidance are exhibited.

This action aims to manage the communication and dissemination activities related to NanoRISK project, ensuring the quality of the activities to develop and guaranteeing the accessibility to the project results by means of:

- A comprehensive project website
- Elaboration of informative material, such as:
 - Layman's report,
 - Leaflets,
 - Roll ups,
 - Newsletters,
 - Factsheets,
 - informative video
 - Dissemination of results thorough webinars and workshops



Actions E. Project management and monitoring of the project progress

NanoRISK project will have a management structure in line with the complexity of the task and the number of partners within the consortium. The main aim of the management is to ensure that the consortium is working as a team in the spirit of cooperation, coordination and commonly understood procedures, and to ensure that the entire related tasks are performed successfully according to the contractual and technical requirements.



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