



## MARINA Report Summary

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### Periodic Report Summary - MARINA (Managing risks of nanoparticles)

Project context and objectives:

The aim of MARINA is to develop and validate the risk management methods for nanomaterials (NMs), see <http://www.marina-fp7.eu>

To do this, MARINA will address the four central themes for the risk assessment and management of NMs: materials, exposure, hazard and risk. In MARINA we will develop beyond state-of-the-art referential tools from each of these themes and integrate them into a risk management toolbox and strategy for both human and environmental health.

There is a need to evaluate and develop specific reference methods for all the fundamental steps in managing the potential risk of engineered nano materials (ENM). The methods must be integrated in an overarching, coherent strategy for regulators and industry to adapt them. Thus, a safe and environmentally responsible nanotechnology will safeguard current and future global investments and will be the key to the sustainability of this industry.

While there are standard procedures for the material identification, exposure-, hazard- and risk assessment for traditional chemicals, it is not yet clear how these procedures need to be modified, or renewed to address all the novel properties of NMs. There is a need to evaluate and develop specific reference methods for all the fundamental steps in managing the potential risk of ENM. The aim of MARINA is to develop and validate the risk management methods for NMs. To do this, MARINA will address the four central themes for the risk assessment and management of NMs: materials, exposure, hazard and risk. In MARINA we will develop beyond-state-of-the-art referential tools from each of these themes and integrate them into a risk management toolbox and strategy for both human and environmental health. Specifically, MARINA will use and develop:

1. a well tested set of reference NMs with thoroughly validated referential characterisation methods, work package three (WP3) and WP4;
2. methods to further understand the properties, interaction, exposure and fate of ENM in relation to human health and the quality of the environment (WP5 to WP8);
3. validated, harmonised and standardised reference methods for hazard assessment for both human health and environment culminating in an integrated/intelligent testing strategy (WP9 to WP11);
4. risk assessment tools by combining elements of targets one to three; strategies for monitoring ENM exposure for human health and environment (including estimating the size and possible pollution scenario caused by massive release, e.g. explosion or environmental spillage) and integrate them into a risk management toolbox and strategy for risk reduction (WP12 to WP16).

In addition, MARINA uses case studies to illustrate the use of the MARINA referential risk management tools.

Project results:

For this reporting period, there are notable achievements in the followings:

For MARINA, the procedures for implementing the administrative and scientific management are in place. The steering board, advisory board and general assembly have been activated. The scientific management of the quality of work and progress is continuing, with regular meetings and meetings / teleconferences. External collaboration and information sharing activities with other projects, especially Nanovalid, have been established. The MARINA database is created and data collection templates were made available to the participants. Reference NMs (ENM) have been distributed to all experimental partners, with the ENM being characterised, labelled and verified in regard to homogeneity and stability. This is coupled with development of harmonised protocols for ENM characterisation in complex matrices. ENM reference dossiers with industrial, scientific and regulatory relevance have been compiled. The assessment of the release processes during production, processing and during handling (by consumer / workers) is progressing. To this the partners have developed a searchable database tool of occupational exposure scenarios, reviewed existing exposure models and evaluated protocols for workplace exposure measurement surveys. A tiered exposure assessment

approach for human risk assessment was introduced. MARINA partners are implementing an information database on ENM fate-determining parameters in the environment and biota. Protocols are developed for assessment of the fate and behaviour of ENM in well-characterised model-systems. This work is complimented by the development of novel methods to actual measure ENM in complex environmental matrices. Within the hazard assessment the characterisation and exposure studies were matched with extensive human health (in vitro and inhalation) and environmental (various species) studies measuring a wide variety of hazard (including bioaccumulation) parameters. Elaborated pipelines for detailed system biology studies have been established for retrieving mode-of-action information. To integrate this risk-assessment, - management and - reduction paradigms have been developed with focus on nano-specific issues e.g. how to handle NM size in a risk assessment and to monitor NMs in situ. The current approaches are being evaluated and novel approach suggested, setting this in a regulatory perspective. Accidental release studies focus on relating NM parameters to risk of explosive behaviour. To ensure fast and knowledge progress training and dissemination activities have been initiated, this includes both internal exchange of information and external information flow to the research community and to the public.

Potential impact:

MARINA is expected to make a significant impact on the European objectives for the safe, integrated and responsible approach to the development of nanotechnology. Specifically, for the development of comprehensive understanding of the properties, interaction and fate of ENM in relation to human health and environment, results generated within MARINA in this reporting period are providing an overarching understanding of the interaction of ENM with humans and the environment and therefore helping to assess and manage the potential risk of ENM. MARINA is continuing to develop validated reference methods for managing the risks of ENM.

For support to policy and decision-making concerning nanotechnology in respect to various stakeholders, MARINA is providing a unique resource of information and methodology. It supports the shifting from case-by-case evaluation of individual ENM risk to a more holistic health and environmental safety assessment and management that addresses overall risks decision makers and Industry will find information directly in a format, which allows analysis across endpoints, across material types or preparation forms.

For contribution to the future definition of appropriate measures, where needed, MARINA objectives continues to develop standard, reference methods covering a wide range of themes, from materials to risk.

For support to good governance in nanotechnology MARINA is contributing to an overarching strategy for risk management and reduction and enabling the European Union (EU) regulatory bodies, agencies and authorities to make informed decisions and policies to safeguard consumers while taking full advantage of the advancements that nanotechnologies will bring to the economy and competitiveness of EU industry.

For support to pre and co-normative activities, such as with reference to the implementation of Reach, MARINA is contributing to the Reach process through our activities and the ITS. MARINA also works with the European Commission (EC) and global, e.g. Organisation for Economic Cooperation and Development (OECD) services involved in development of adaptations of REACH guidance documents concerning NMs.

For support to the safe, integrated and responsible approach as laid down in 'Nanosciences and nanotechnologies: An action plan for Europe', the risk management recommendations are being developed in cooperation between MARINA scientists and industrial stakeholders.

Project website:

<http://www.marina-fp7.eu>

## Related information

**Documents and**

[Periodic Report - MARINA \(Managing risks of nanoparticles\)](#)

**Publications**

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## Subjects

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Nanotechnology and Nanosciences

Collaboration sought: N/A

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