Safety and Risks of Nanotechnology:
Overview of completed and ongoing activities
(Abstract)

The report "Safety and Risks of Nanotechnology: Overview of completed and ongoing activities" was originally written to provide a non-exhaustive overview of worldwide studies dealing with safety and risk assessment issues of the rapidly developing field of nanotechnology.

It was, and still is, not the intention of the report to completely cover all activities worldwide in the field, but to give an overview and summarize the most important findings connected to nanoparticle toxicology, environmental effects, and public perception of nanotechnology, and to sketch the temporal development of knowledge and the debate about nanotechnology risks.

With respect to this, the report is regularly updated and adapted to new activities or developments connected to nanotechnology risk assessment.

Thus, in the current Version 3 a new chapter has been dedicated to the emergence of databases on safety and risks of nanotechnology. Also, the list of key players in risk assessment of nanotechnology has been largely extended.

The structure of the report now is as follows:

- In an introductory part (chapters 1 and 2) the objectives and the approach of the report are outlined
- Subsequently, the current status of the debate about the safety of nanotechnology is summarized (chapter 3.1)
- A collection of recent key publications from both proponents and critics of nanotechnology form the main body of the report (chapter 3.2)
- As a tribute to the rising number of conferences and other events with topics related to nano safety the next part summarizes a selection of them (chapter 3.3)
- In the following part secondary literature about nano safety issues (newspaper articles and web releases) is overviewed (chapter 3.4)
- Current international (EU, USA) programs supporting research on health and environmental safety aspects of the use of emerging nanotechnology products are then summarized (chapter 3.5)
- In a new chapter emerging databases on safety and risks of nanotechnology and the corresponding links are listed (chapter 3.6)
- Subsequently, comments from the European Community are summarized (chapter 3.7)
- In the last chapters key players in the field of risk assessment of nanotechnology are listed (chapter 4) and conclusions drawn (chapter 5)

Below, a short summary of the contents of the report is given:

With their reports the Non Governmental Organisations (NGOs) Greenpeace and Canada based ETC Group take the lead in publicly raising questions about the safety of nanotechnology and its future impact on the environment, health and society in general. The report initiated by Greenpeace remains quite neutral in terms of policy recommendations. The ETC report on "Atomtech" provoked a vast echo in the international press and has started the public debate about the future of applied nanotechnology. The second ETC report, "Nano´s Troubled Waters" also had

a strong impact on the public debate. In a very recent report on nanogeopolitics, ETC is calling for an early warning / listening system, based on an International Convention for the Evaluation of New Technologies.

On the other hand, consciousness is mounting on the side of the advocates of nanotechnology that scientific studies investigating the effect of nanomaterials on living matter are urgently needed, especially now that a number of toxic effects of certain nano particles have been found. Very prominent among them are results lately obtained by V. Colvin, G. Oberdörster and by E. Oberdörster. Lately, many publications addressing specific safety issues of nanotechnology as well as overviews of new data concerning toxicological or environmental risks are emerging. Addditionally, there is a large body of literature and studies investigating the effects of ultrafine particles (e.g. Diesel exhaust, coal dust, quartz dust) on human health. Since the surface characteristics of ultrafine particles play an important role in their toxicity, it remains to be seen to what extend this knowledge is applicable to the assessment of the potential biological impacts of engineered nanoparticles.

The increasing number of conferences and other events worldwide shows the rising importance and the growing awareness of the problems connected to nanotechnology. The topics addressed cover all relevant fields of risks alike.

A center of interest for newspapers and web publications are very recent activities by the EPA, which has for the first time ruled on a manufacturer's application to make a product composed of nanomaterials, as well as the recommendations given by the NanoJury UK in their verdict about nanotechnology.

Worldwide, and especially in Europe and the USA, an increasing fraction of funding is devoted to investigating nanotechnology's potential impacts. In 2003 the "NANOSAFE" project was funded within the Fifth Framework Programme of the European Union. NANOSAFE assesses risks involved in the production, handling and use of nanoparticles in industrial processes and products, as well as in consumer products. Within the Sixth Framework Programme of the European Union further calls for such risk assessment projects have been published, resulting in projects like NANOSAFE II, IMPART, NANOTOX, NANODIALOGUE, or NANOLOGUE.

As a very positive development lately databases about toxicological and other data of nanomaterials are being put on the web. A very promising start was made by CBEN of Rice University and ICON with their nanotechnology risks database.

Thus, the lately evolving results and increasing number of activities can form the basis for risk assessment and future recommendations about the production, use and disposal of nanomaterials. A future key task will be the regional and global coordination of the findings and an appropriate dissemination strategy to reach all stakeholders as well as the public.