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# An Overview of Nanotechnology Initiatives in the EU

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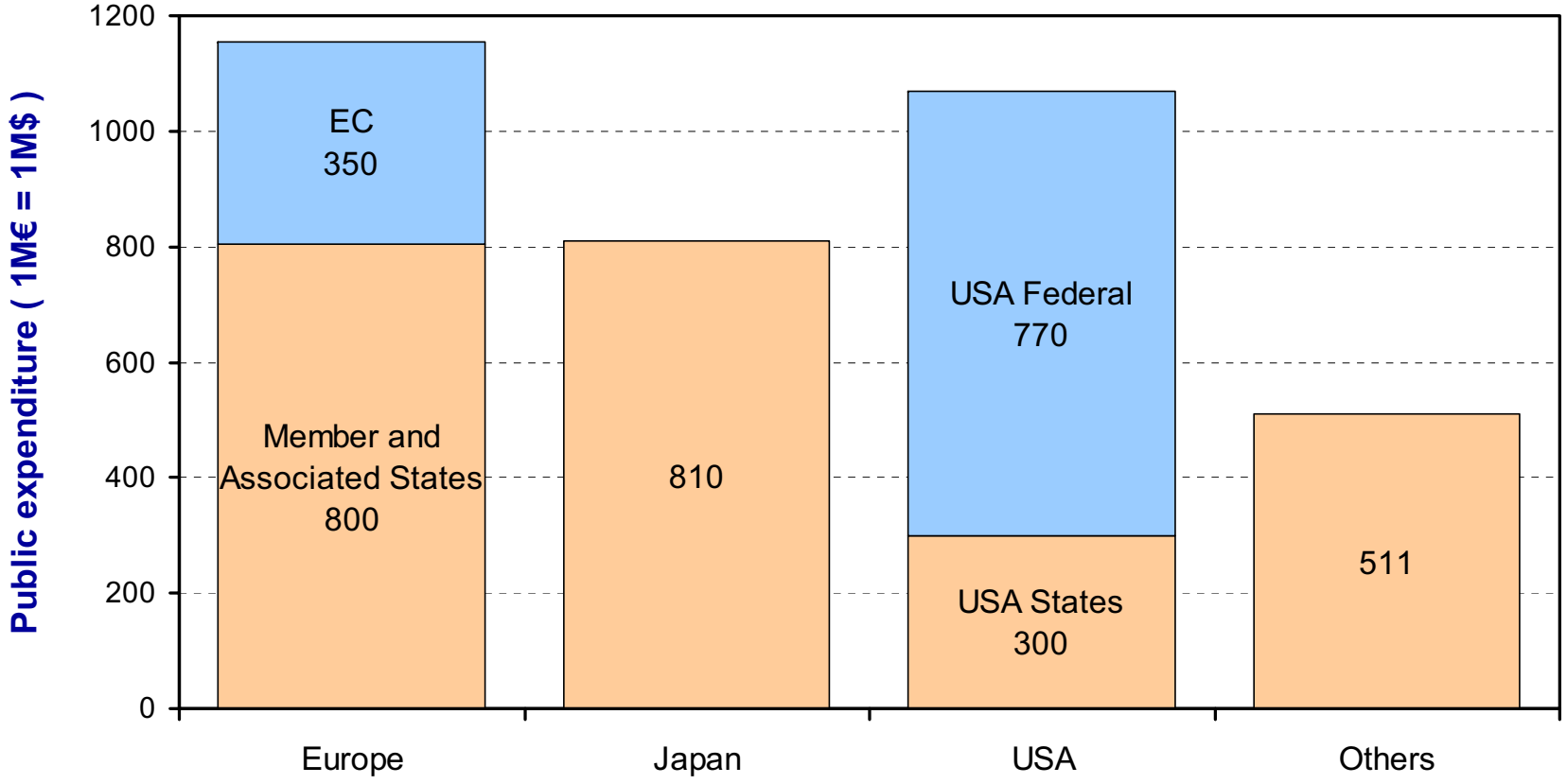
Disclaimer: Note that these slides are not legally binding and do not represent any commitment on behalf of the European Commission

# R&D expenditures in 2003




*Source: European Commission (2004)*

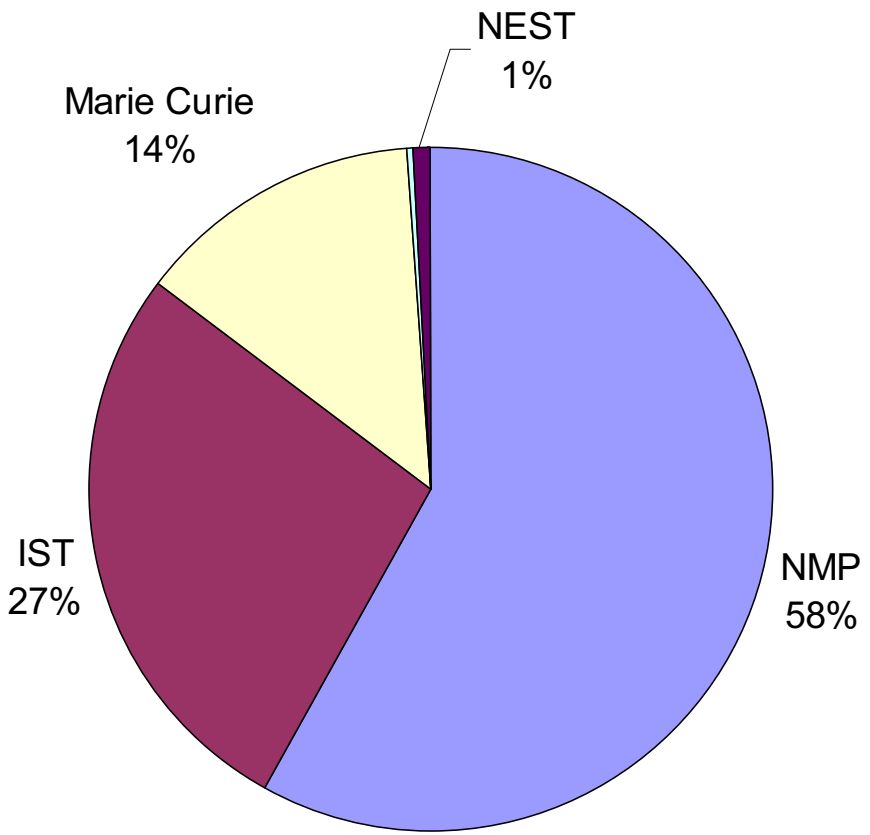
# The 6th Framework Programme

## Budget 2002 – 2006

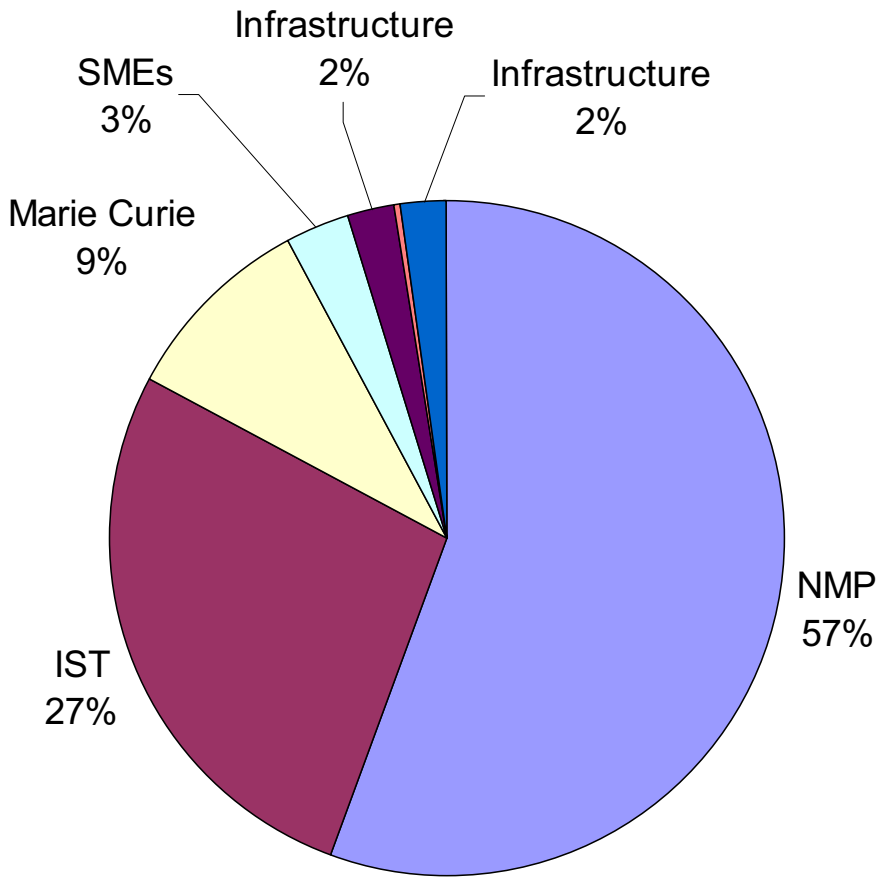
| | |
|---|---|
| **Focusing and Integrating ERA** | **13345** |
| • **Pr 1** genomics and biotech for health | 2255 |
| • **Pr 2** information society technologies | 3625 |
| • **Pr 3** nanotech, intelligent mat, production | 1300 |
| • **Pr 4** aeronautics and space | 1075 |
| • **Pr 5** food safety and health risks | 685 |
| • **Pr 6** sustainable dev & global change | 2120 |
| • **Pr 7** citizens and governance | 225 |
| • **Pr 8** anticipating needs (INCO, CRAFT, JRC, etc) | *2080* |
| **Structuring the ERA** | **2605** |
| research & innovation, human resources, infrastructures, science & society | |
| **Strengthening the Foundations of ERA** | **320** |
| coordination of activities, development of policies | |
| **TOTAL with Euratom (Millions €)** | **17500** |

*+ 10%*

# Nanotechnology R&D in the EU Sixth Framework




***2004***




***2005***

**•Some examples of FP6 « nano » projects**

•CANAPE: *Carbon **Nanotubes** for Applications in Electronics, Catalysis, Composites and Nano-Biology* – University of Cambridge (UK)

•NAIMO: *Nanoscale Integrated processing of **self-organizing** Multifunctional Organic Materials* - Université Libre de Bruxelles (BE)

•NANOFUN-POLY: *Nanostructured and functional **polymer-based** materials and nanocomposites* - Consorzio Interuniversitario Scienza e Tecnologia dei Materiali (IT)

•RADSAS: *Rational Design and Characterisation of **Supramolecular** Architectures on Surfaces* - Eidgenössische Materialprüfungs- und Forschungsanstalt (CH)

•BIOMACH: ***Molecular Machines** - Design and Nano-Scale Handling of Biological Antetypes and Artificial Mimics* - Forschungszentrum Karlsruhe GmbH (DE)

•Cornea engineering: *Three-dimensional reconstruction of human **corneas** by tissue engineering"* - Centre National de la Recherche Scientifique / Rhône Alpes (FR)

•Ambio: *Advanced nanostructured surfaces for the control of **biofouling*** - University of Birmingham (UK) *(not yet signed so far!)*

•ANVOC: *Application of nanotechnologies for **separation and recovery** of volatile organic compounds from waste air streams* – S&T Research Council of Turkey (TU)

•NANOSAFE2: ***Safe production and use** of nanomaterials* - Commissariat à l'Energie Atomique (FR) *(not yet signed so far!)*

•Nanologue: *Facilitating the **dialogue** between research, business and the civil society to improve the quality of life, create wealth and reduce impacts to society* - Wuppertal Institute for Climate, Energy and the Environment GmbH (DE)

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# How does funding from Brussels address ‘nanosafety’?

# How to ensure that nanotechnology is safe? Examples of projects that have been funded

- Applications of nanotechnology must ensure a high level of public health, safety, consumer and environmental protection.
- Any risks must be addressed upfront and as an integral part of the R&D process.
- Specific toxicological studies for e.g. nanoparticles are underway at European level.

Nano-pathologies

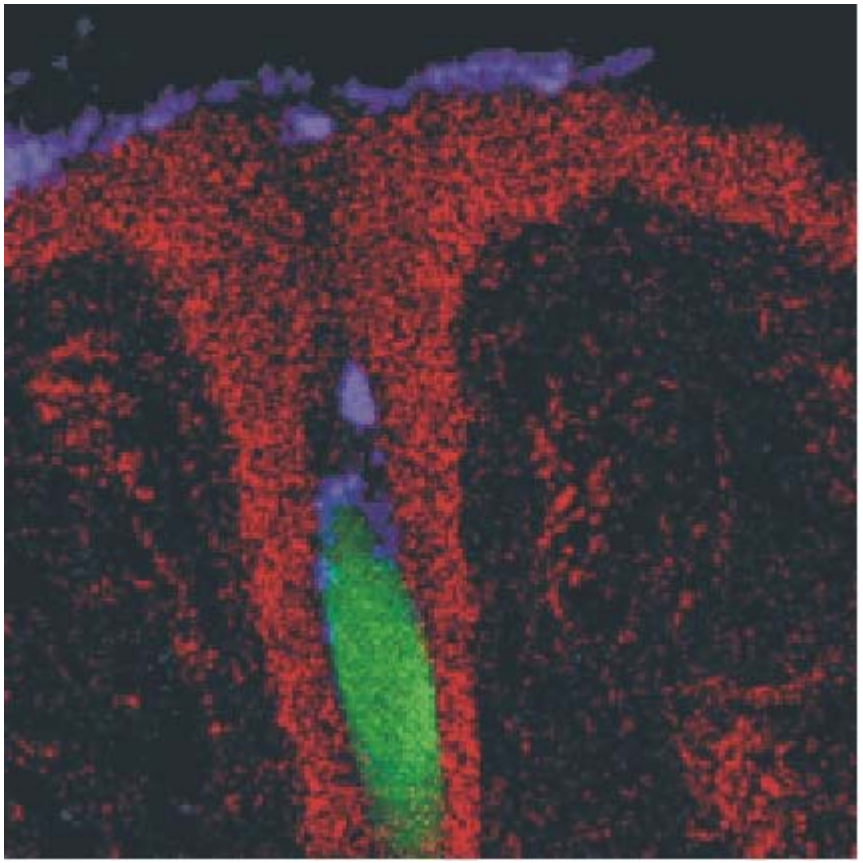
*The role of micro and nanoparticles in biomaterial-induced pathology*

RTD Project N. QLRT-2001-147 funded by European Commission (2002-2005)

NANO DERM

nano SAFE

NANODERM investigates the percutaneous uptake of ultra-fine particles. TiO2 with diameters of about 20 nm in various formulations.

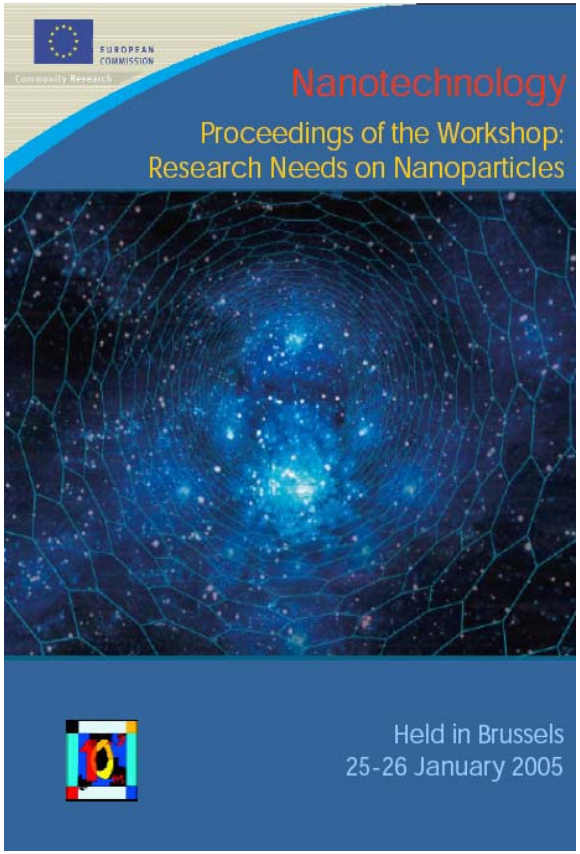


Particle induced X-ray emission image(μPIXE, 400 × 400 μm²) of porcine skincross-section showing Ti penetration(blue) into hair follicle (green: sulphur,red: phosphorus).

**NANOSAFE – Risk assessment in Production and Use of Nanoparticles**
with Development of Preventive Measures and Practice Codes

The objectives were to assemble available information on the possible hazards of nanoparticles,to evaluate risks to workers and consumers, as well as to recommend regulatory measures and codes of practice to obviate any danger.

NANOSAFE2 will develop **innovative detection, traceability and characterization** techniques for engineered nanoparticles. Both **air and liquid media** will be investigated.



# Final NMP Calls of FP6

Nanosciences and Nanotechnologies
Deadline 15 September 2005 Budget of 120M€

1.1 Interdisciplinary research into understanding phenomena, mastering processes and developing research tools

- Towards converging technologies (STREP)
- **Standardisation for nanotechnologies (SSA)**

1.2 Nano-biotechnologies

- Using nature as a model for new nanotechnology-based processes (STREP)

1.3 Nano-metre-scale engineering techniques to create materials

- 3D nano-structures based on elements other than carbon (STREP)

1.5 Applications in areas such as health and medical systems, chemistry, food and the environment

- Nanotechnology-based targeted drug delivery (IP)
- **Interaction of engineered nanoparticles with the environment and the living world (STREP)**

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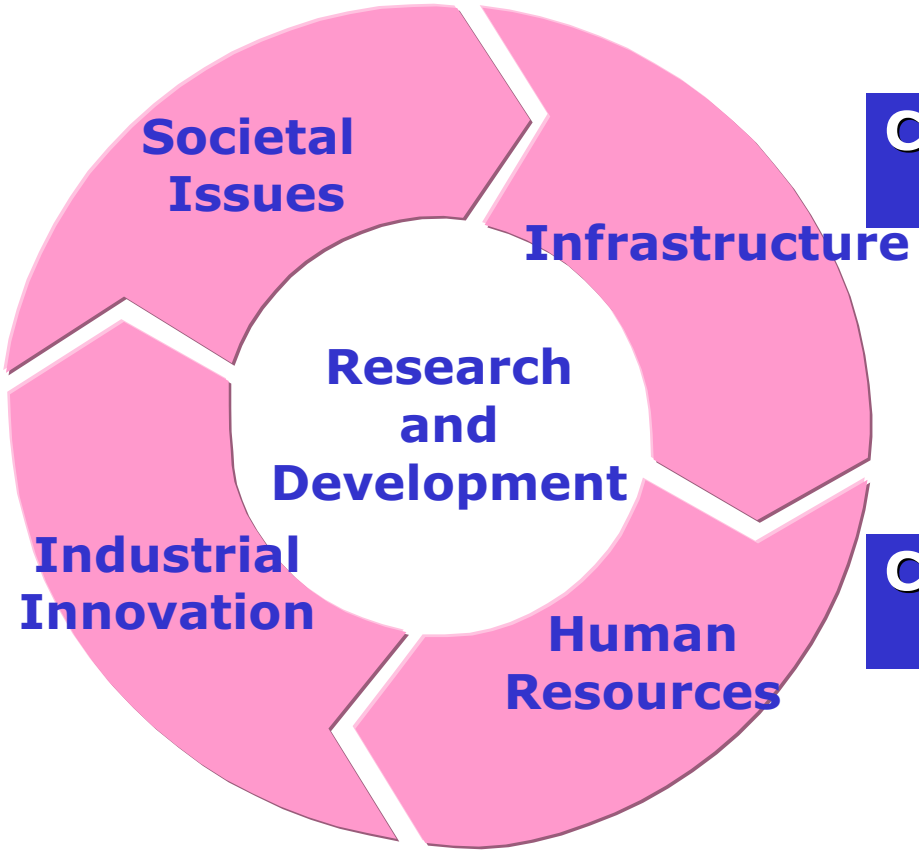
# A European Strategy and Action Plan for nanotechnology

# The European approach: *integrated* and *responsible*

Communication by the European Commission:
**"Towards a European strategy for nanotechnology"**
and newly adopted "Action Plan"




**Health, safety, environmental and consumer protection**

**COM(2004) 338 of 12.5.2004**

**International Co-operation**

**COM(2005) 243 of 7.6.2005**

# Evolution of the European Strategy

- Ad-hoc expert group meetings convened in 2003 to establish to status of nanotechnology in Europe

- EuroNanoForum meeting held in 2003 with over 1000 participants where an integrated approach was endorsed

EuroNanoForum 2003
Trieste - Italy / 9,10,11,12 December
European Commission
DG Research
Industrial Technologies

- Communication drafted by the Directorate General (DG) for Research and agreed with 16 other DGs
- Published on the 12th May with discussions by the Council during the Irish and Dutch Presidencies

# The Strategy

## Seven areas for proposed action, including:

### 5. Societal aspects:

- (a) an open and proactive approach to to ensure public awareness and confidence;
- (b) encourage a dialogue with EU citizens/consumers to promote informed judgement ;
- (c) reaffirm commitment to ethical principles.

### 6. In support of public health, safety, environmental and consumer protection

- (a) to identify and address safety concerns at the earliest possible stage;
- (b) integration of health, environmental, risk and other related aspects into R&D;
- (c) to support the generation of data on toxicology and ecotoxicology.

The Commission calls upon the Member States to promote:

- (d) the adjustment of risk assessment procedures;
- (e) the integration of assessment of risk to human health and the environment.

# The Action Plan

- The European Council meeting of 24 September 2004, welcomed the Commissions intention to prepare an Action Plan for nanotechnologies following the proposed strategy
- Towards end October 2004, ideas were elaborated drawing upon the outcome of the consultation and inputs from an informal groups
- During Spring 2005, inter-service discussions took place among several DGs to prepare the final drafts and ensure consistency
- Adoption on 7 June 2005 May, complementing proposals for the Seventh Framework Programme (FP7)

# An Action Plan has been adopted on 7 June 2005: COM(2005)234

**Eight groups of actions divided according to:**

- Research, Development and Innovation
- Infrastructure and European Poles of Excellence
- Interdisciplinary Human Resources: Europe needs Creativity
- Industrial Innovation: From Knowledge to the Market
- **Integrating the Societal Dimension: Expectations and Concerns**
- **Public Health, Safety, Environment and Consumer Protection**
- International Cooperation
- Implementing a Coherent Approach at European Level

**Detailed actions have been elaborated in each of the above areas**

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# Public Health, Safety, Environment and Consumer Protection I

**The Commission will:**

a) **Identify and address safety concerns associated with applications and use of N&N at the earliest possible stage. The Scientific Committee on Emerging and Newly Identified Health Risks has been requested to provide an opinion on the appropriateness of existing methodologies to assess the potential risks associated with engineered and adventitious products of N&N;**

b) **Promote safe and cost-effective measures to minimise exposure of workers, consumers and the environment to manufactured nano-scale entities. It will also support a wide range of studies (including epidemiological studies) to (i) evaluate current and future projected levels of exposure, (ii) evaluate the adequacy of current approaches to control exposure and (iii) launch appropriate initiatives, propose measures and/or issue recommendations;**

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# Public Health, Safety, Environment and Consumer Protection II

**The Commission will (continued):**

c) **Develop with Member States, international organisations, European agencies, industry and other stakeholders, terminology, guidelines, models and standards for risk assessment throughout the whole life-cycle of N&N products. Where appropriate, risk assessment and management procedures will need to be adapted accordingly to ensure a high level of protection;**

d) **Examine and, where appropriate, propose adaptations of EU regulations in relevant sectors in light of the above paying particular, but not exclusive, attention to (i) toxicity thresholds, (ii) measurement and emission thresholds, (iii) labelling requirements, (iv) risk assessment and exposure thresholds and (v) production and import thresholds, below which a substance may be exempt from regulation, are typically based upon mass quantities.**

# Public Health, Safety, Environment and Consumer Protection III

**The Commission calls upon Member States to:**

a) To make inventories of use and exposures of N&N applications, in particular, manufactured nano-scale entities;

b) Review and, where appropriate, modify national legislation to take into account the specificities of N&N applications and use;

c) Take nanoparticles into account in the enforcement of the new substances notification scheme under Directive 67/548/EEC;

d) Support the adoption of universally recognised Chemicals Abstract Service registry numbers and Material Safety Data Sheets for nanomaterials.

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# Towards global action?
# The “Nano” International Cooperation

# “Nano-specific” International Cooperation

- The European Commission seeks international debate on nanotechnology-related issues such as public health, safety, environment, consumer protection, risk assessment, metrology, norms, …;
- Europe promotes the monitoring and sharing at international level of information related to the scientific, technological, economical & social development of nanotechnology;
- Europe strives for an international “code of conduct” for the responsible development of nanotechnology and to avoid a “nano-divide”.

# Proposals for the Seventh FP

- Proposals adopted by the Commission on the 6 April 2005 for the next Framework Programme (2007-2013)

COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 6 April 2005
COM(2005) 119 final

Proposal for a

DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

concerning the seventh framework programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

- Doubling of the overall budget proposed with big increases for nanosciences and nanotechnologies
- Proposal now to be discussed by the Member States in the Council and the European Parliament

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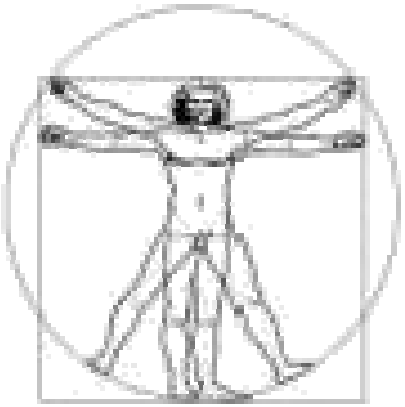
# The idea to explore: a high-level declaration on “responsible nanotech” and a set of actions

•Commitment of political value to be taken at top-level. Parties of the declaration;

• must engage themselves to develop and use nanotechnology in a responsible manner;



• must attribute public funds, devoted to civil R&D, only to projects that respect human dignity and integrity, and that do not harm health and/or the environment.

• Industry will be invited to adhere.

# Thank you for your attention!

**Full text of the Communication and information on nanotechnology in Europe can be downloaded from:**

**http://www.cordis.lu/nanotechnology**

**Please provide your comments:**

**rtd-nano-strategy@cec.eu.int**

**Other nanotechnology information also from:**

nanoforum.org
European Nanotechnology Gateway