



# **EC Industrial Research**

**Towards an increased contribution from  
standardisation to innovation in Europe**

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# The EC research

- **Lisbon strategy for growth and Jobs...**
- **FP7 - the 7th Framework Programme for Research of the EC (2007 – 2013)**  
**“Building the Europe of knowledge”**
- **NMP - Theme 4 “Nanosciences, nanotechnologies, Materials, and new Production technologies”**
  - **Industrial research programme**



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# NMP aims at Industrial Transformation

**In the globalised economy,  
EU industry must focus upon creating products  
with more added-value**

**especially by moving from:**

- Individual to system competitiveness
- Resource-based to knowledge-based economies
- Macro → micro → nano
- Mono-disciplinarity → interdisciplinarity → convergence





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# The challenges for Nano

- **Next technological revolution**
- **Massive investment**
- **New materials, properties, products**
- **Huge impact for medicine, energy, water, food, etc.**
- **But ... New potential risks**



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# Nanotechnology Risks

- **Accidental**
  - **Occupational disease**
  - **Consumer products**
  - **Environmental**
1. **Event control through containment of processes**
  2. **Exposure control through detection, measurement, characterisation, protection**
  3. **Consequences largely unknown**



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# Problem dimensions

- **Emerging**
- **Global**
- **Crucial**
- **Several industrial sectors involved**
- **Unclear framework in standards, experience, inspection, ...**
- **Generic legislation exists**



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# Knowledge gaps

- **Background level**
- **Measurement methods**
- **Metrics**
- **Biological impact**
- **Exposure data**
- **Risk assessment underpinning data**
- ...



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# Organisational gaps

- **No global strategy, good intentions**
- **Many funding sources, coordination needed**
- **Many research projects, plethora of results**
- **Unpublished or proprietary data**
- **Data comparison and verification**
- **Focus on nanoparticles toxicity and ecotoxicity, not (adequately) on process/product safety**
- **Specific legislation**
- **Standardisation**





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# The future priorities

## Technical areas in risk management:

- **Detection, measurement, characterisation, marking**
- **Exposure control**
- **Safe processes in production and use**
- **Safe handling and transport**
- **Equipment**
- **Hazard identification and impact assessment**

**Standardisation should go hand-in-hand with research in these areas**





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# The road ahead

- **Objective: Total Safety**
- **Research coordination globally**
- **Standardisation supporting research results take-up by industry and authorities**
- **International cooperation for strategic roadmapping**
- **Public-private communication and collaboration**





# Standardisation

- **Standard: Formalisation of behaviour**
  - Formalising jobs
  - Formalising skills
- **Imposed, suggested or agreed upon by legislative rule or other means**
  - System approach
- **A standard is produced through a process;**
  - Efficiency: correspondence of means to ends
- **A standard is based on old, (un)complete knowledge**
  - Fast transfer from research, and completion needed
- **A standard is questioned by new knowledge**
  - Standard life-cycle ↔ technology life-cycle
  - Updating
- **Necessary for market success of innovation**





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# some standards history

## Diolkos at the Isthmus of Corinth

- 600 BC, ref 428 BC, 411 BC and later
- grooves at 1.57 m centre, 5 dorian feet

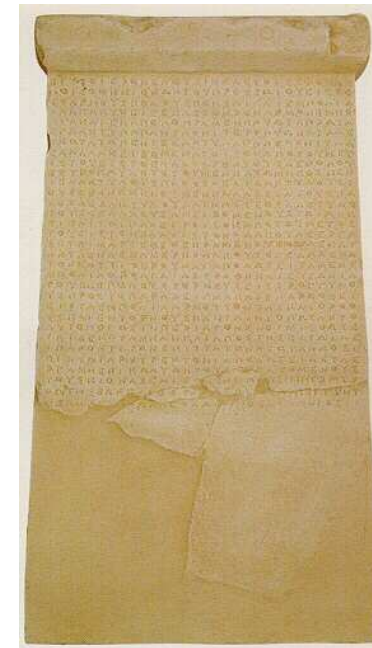


Elefsis stele of the 4th century BC

- "Poloi" and "empolia", 3300 Kg

- in bronze, 1/12 tin, 6.5 x copper price

- Tin content testing method prescribed





## Communication COM(2008)133 Towards an increased contribution from standardisation to innovation in Europe

- **Political objectives**
  - A stronger role for standardisation in support of innovation is important for the European effort to address economic, environmental and social challenges.
  - Standardisation must adapt to the changed (market) landscape, while strengthening its role in support of innovation and competitiveness.
- **Contribution**
  - Standardisation complements market-based competition.
  - Dynamic standardisation is an important enabler of innovation.
  - European leadership, new markets, first-mover advantage
  - Engagement in international formal and informal standardisation
  - An EU active standardisation policy
- **Nanotechnologies in priority**





## Communication COM(2008)133 Towards an increased contribution from standardisation to innovation in Europe

### ■ Nine Key Elements

- market-led standardisation
- importance of both formal and informal standards
- Focus on standards development for the global market
- Facilitate the inclusion of new knowledge in standards,
- Facilitate the access to standardisation of all interested stakeholders, in particular SMEs
- Better address barriers which hinder the actual implementation and effective use of standards
- Due regard to be paid to the interrelation between IPR and standardisation
- The ESOs are the keystone of standardisation
- The focus of European standardisation has to change in accordance with the evolving needs of the European economy and society





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# Impact on Health and the Environment

## RUNNING FP6 - NMP PROJECTS



- **ON SAFETY OF NANOPARTICLES:**
  - **CELLNANOTOX:** Cellular Interaction and Toxicology with Engineered Nanoparticles
  - **DIPNA:** Development of an Integrated Platform for Nanoparticle Analysis to verify their possible toxicity and eco-toxicity
  - **NANOINTERACT:** Development of a platform and toolkit for understanding interactions between nanoparticles and the living world
  - **NANOSH:** Inflammatory and genotoxic effects of engineered nanomaterials
  - **NANOCAP:** Nanotechnology Capacity Building NGOs (FP6-SOCIETY)
  - **IMPART:** Improving the understanding of the impact of nanoparticles on human health and the environment
  - **PARTICLE-RISK:** Risk Assessment of Exposure to Particles (FP6-NEST)
- **SAFETY OF PROCESSES**
  - **NANOSAFE2:** Safe production and use of nanomaterials
  - **SAPHIR:** Controlled Production Of High Tech Multifunctional Products And Their Recycling
- **STANDARDISATION AND METROLOGY:**
  - **NANO-STRAND:** Standardization related to Research and Development for Nanotechnologies
  - **NANOTRANSPORT:** The Behaviour of Aerosols Released to Ambient Air from Nanoparticle Manufacturing - A Pre-normative Study





# Impact on Health and the Environment FP7-NMP: Topics addressed in 2007

<p>NMP-2007-1.3-1 <b>Large RTD Projects</b></p>	<p><b>Specific, easy-to-use portable devices for measurement and analysis</b>  <b>NANODEVICE:</b> Novel Concepts, Methods, and Technologies for the Production of Portable, Easy-to-Use Devices for the Measurement and Analysis of Airborne Engineered Nanoparticles in Workplace Air</p>
<p>NMP-2007-1.3-2 <b>Small RTD projects</b></p>	<p><b>Risk assessment of engineered nanoparticles on health and the environment</b>  <b>NANOMMUNE:</b> Comprehensive assessment of hazardous effects of engineered nanomaterials on the immune system  <b>NANORETOX:</b> The Reactivity and Toxicity of Engineered Nanoparticles: Risks to the Environment and Human Health  <b>NEURONANO:</b> Do nanoparticles induce neurodegenerative diseases? Understanding the origin of reactive oxidative species and protein aggregation and mis-folding phenomena in the presence of nanoparticles</p>
<p>NMP-2007-1.3-3 <b>Coordination</b></p>	<p><b>Scientific review on the data and studies on the potential impact on health, safety and the environment of engineered nanoparticles</b>  <b>ENRHES:</b> Engineered Nanoparticles: Review of Health and Environmental Safety</p>
<p>NMP-2007-1.3-4 <b>Coordination</b></p>	<p><b>Creation of a critical and commented database on the health, safety and environmental impact of nanoparticles</b>  <b>NHECD</b></p>
<p>NMP-2007-1.3-5 <b>Coordination</b></p>	<p><b>Coordination in studying the environmental, safety and health impact of engineered nanoparticles and nanotechnology based materials and products</b>  <b>NANOIMPACTNET:</b> The European Network on the Health and Environmental Impact of Nanomaterials</p>
<p>HEALTH-2007-1.3-4 <b>Small RTD projects</b></p>	<p><b>Alternative testing strategies for the assessment of the toxicological profile of nanoparticles used in medical diagnostics</b>  <b>NANOTEST:</b> Development of methodology for alternative testing strategies for the assessment of the toxicological profile of nanoparticles used in medical diagnostics</p>



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# Impact on Health and the Environment FP7-NMP: Topics addressed in 2008

<p><b>NMP-2008-1.3-1</b> <b>Large RTD Projects</b></p>	<p><b>Validation, adaptation and/or development of risk assessment methodology for engineered nano-particles</b> No proposals selected</p>
<p><b>NMP-2008-1.3-2</b> <b>Coordination</b></p>	<p><b>Impact of engineered nanoparticles on health and the environment</b></p> <p><b>ENNSATOX:</b> Engineered Nanoparticle Impact on Aquatic Environments: Structure, Activity and Toxicology <b>ENPRA:</b> Risk Assessment Of Engineered Nanoparticles <b>HINAMOX:</b> Health Impact of Engineered Metal and Metal Oxide Nanoparticles: Response, Bioimaging and Distribution at Cellular and Body Level <b>INLIVETOX:</b> Intestinal, Liver and Endothelial Nanoparticle Toxicity Development and evaluation of a novel tool for high-throughput data generation <b>NEPHH:</b> Nanomaterials Related Environmental Pollution And Health Hazards Throughout Their Life Cycle</p>



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# Impact on Health and the Environment FP7-NMP: Topics addressed in 2009 Submissions deadline 31/3/2009

<p>NMP-2008-1.3-1 <b>Small RTD projects</b></p>	<p>Activities towards the development of appropriate solutions for the use, recycling and/or final treatment of nanotechnology-based products (Joint call with Theme 6: 'Environment - including Climate Change')</p>
<p>NMP-2008-1.3-2 <b>Coordination</b></p>	<p>Exposure scenarios to nanoparticles <b>NANEX:</b> Development of Exposure Scenarios, for Manufactured Nanomaterials</p>



## The NANOSTRAND project

- **Nano-metrology roadmap 2008-2018**
  - Dimensional; Mechanical; Chemical; Structured materials; electronics and fabrication; Bio
- **Standards supporting HSE** (short-medium term priorities)
- **Standards supporting the Lisbon agenda** (short-medium-long term priorities)
- **Standards supporting the societal agenda** (medium-long term priorities)
- Considerable input for the requested CEN TC352 mandate





# The Nanosafe2 project

- **Some of the 17 possible standards identified:**
  - ***Labelling of CNTs and other nanoparticles for subsequent source identification***
  - ***Guidance on measurement of CNTs by particle counters***
  - ***Standard method for generation of a nanoparticle flux for the calibration of particle counters***
  - ***Risk analysis methodology for explosion potential of nanomaterials***
  - ***Qualification of filters and Personal Protective Equipment relevant to nanoparticle manufacture and handling***
  - ***Nanoparticle penetration of biological membranes – method and equipment***
  - ***In silico models of site specific toxicity of nanomaterials and algorithms to predict body distribution***





# The next steps in risk RTD

- **A projects cluster on Nano-Toxicology**
  - Three meetings 26/2, 1/4, 28-29/4/2009, next in August and October
  - Synergy, projects mapping, data, test protocols, results verification and validation, material characterisation, research roadmapping
- **Infrastructure integration**
- **Modelling/simulation**
- **Risk monitoring**
- **Risk reduction**
- **International cooperation**
- **Standardisation**





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# Barriers

- **Lack of awareness**
- **Access problems to standards bodies**
- **Complex and formal**
- **Formal vs informal**
- **No funding after project end**
- **IPR issues**
- **Insufficient speed or failure to deliver**
- **Revision of standards**
- **Cross border technology fields**
- **SMEs concerns**





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# RTD / standardisation clusters

- **Bio-chips, bio-sensors and diagnostics**
- **Other Bio applications**
- **Nanomanufacturing**
- **Nanomaterials**
- **Self assembly, templating and nanopatterning**
- **Tools for nanotechnology**
- **Toxicology and safety**



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# Standards From RTD to Innovation

- **Integration of standardisation process in technology implementation policy inside large projects (> 4 M€ funding)**
- **Clusters of small projects; Networks (eg. <http://www.nanoimpactnet.eu> ); Integration of national projects**
- **Competences and infrastructure integration**
- **European Technology Platforms, complemented by national TPs, as open stakeholders fora, include standardisation in the implementation plan of their Strategic Research Agenda (NANOFUTURES)**
- **Involvement of projects, clusters, platforms in International Organisations**





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## ***Information on Nanotechnology in EC***

- **Commission Nanotechnologies homepage**

<http://cordis.europa.eu/nanotechnology/>

[http://ec.europa.eu/nanotechnology/index\\_en.html](http://ec.europa.eu/nanotechnology/index_en.html)

## **Additional information on nanotechnology:**

