



SESSION 3.5:

***NANO RESPONSIBLE DEVELOPMENT***

***The Concept of Responsible  
Nanotechnology: History, Challenges,  
and Opportunities***

Session Chair: Dr Steffi Friedrichs  
Biotechnology, Nanotechnology and  
Converging Technologies  
OECD

*NanoSafe, 7<sup>th</sup> – 10<sup>th</sup> November 2016, Grenoble*

# Outline

This presentation will not provide a Road Map ...

.... It will rather be:

## Safe Nanotechnology

The NORTH  
Market Approval  
Public Acceptance



10nm



Parallel Tracks & Road Works:



- Safe-by-Design
- EU 2014 – 2020: RRI

Scenic route :

- History of Responsible Nanotechnology
- RRI Adventure Trail
- Opportunity Viewing Platforms



Prior Stops:

- OECD (2013): Responsible Development of Nanotechnology
- OECD (2013): Policy Environments and Governance for Innovation and Sustainable Growth Through Nanotechnology
  - EC (2009): A Code of Conduct for Responsible Nanosciences and Nanotechnologies Research
  - 2009: Responsible NanoCode
- CPD CEN/TS 16937:2016



Nanotechnologies —  
Guidance for the responsible  
development of  
nanotechnologies

bsi.



# History & Context(1): The Responsible NanoCode

- 2006 – 2008: The Responsible NanoCode (i.e. a Code of Conduct for Responsible Nanotechnology)
  - Initiated in 2006 during a nanotechnology stakeholder meeting, involving government (UK), industry, academia (science and humanities), NGOs (consumer, environmental), labour groups, financial sector representatives.
  - Developed by an expert committee of all stakeholder groups
  - To be implemented by companies (according to a ‘comply or explain’ principle)
- Success (!?):
  - Several small companies used and referred to it
  - Large companies were worried ... (about public claims, litigation, advertising nanotechnology ...)

[<http://www.nanotechia.org/activities/responsible-nano-code>]

**ResponsibleNanoCode**

The Responsible Nano Code – Update May 2008

The Working Group of the Responsible Nano Code has finalised the Seven Principles of the Code for Responsible Nanotechnology and a series of Examples of Good Practice. These Examples will be the starting point for a more detailed Benchmarking Framework, which will be developed over the next 12 months to which organisations are encouraged to contribute. Organisations are encouraged to use the Examples of Good Practice to help them develop their own Code of Practice for Responsible Nanotechnology. The Code will, in 2009, and which they are operating in, be adopted and don't to be undertaken by an independent group who are encouraged to adopt the Code in 2009. Examples of Good Practice attached is a further set of documents, together with further details can be found

### The Seven Principles of the Responsible Nano Code

These seven Principles form the basis of the Responsible Nano Code. As the Code is designed for adoption by organisations involved in the research, development, manufacturing, retailing, disposal and recycling of products using nanotechnologies, it is likely that some Principles may have more relevance to certain organisations than others.

<b>Principle One – Board Accountability</b>
Each organisation shall ensure that accountability for guiding and managing its involvement with nanotechnologies resides with the Board or is delegated to an appropriate senior executive or committee.
<b>Principle Two – Stakeholder Involvement</b>
Each organisation shall identify its nanotechnology stakeholders, proactively engage with them and be responsive to their views.
<b>Principle Three – Worker Health &amp; Safety</b>
Each organisation shall ensure high standards of occupational health and safety for its workers handling nano-materials and nano-enabled products. It shall also consider occupational health and safety issues for workers at other stages of the product lifecycle.
<b>Principle Four – Public Health, Safety &amp; Environmental Risks</b>
Each Organisation shall carry out thorough risk assessments and minimise any potential public health, safety or environmental risks relating to its products using nanotechnologies. It shall also consider the public health, safety and environmental risks throughout the product lifecycle.
<b>Principle Five – Wider Social, Environmental, Health and Ethical Implications and Impacts</b>
Each organisation shall consider and contribute to addressing the wider social, environmental, health and ethical implications and impacts of their involvement with nanotechnologies.
<b>Principle Six – Engaging with Business Partners</b>
Each organisation shall engage proactively, openly and co-operatively with business partners to encourage and stimulate their adoption of the Code.
<b>Principle Seven – Transparency and Disclosure</b>
Each organisation shall be open and transparent about its involvement with and management of nanotechnologies and report regularly and clearly on how it implements the Responsible Nano Code



# History & Context (2): The EC's Code of Conduct

- 2008: The European Commission Code of Conduct for Responsible Nanosciences and Nanotechnologies Research
  - Launched in 2009
  - Details obligations for:
    - Researchers
    - Research funding bodies
    - Member States
    - EU Commission
- resistance from (Universities and Research Organisations in) Member States
- never been formally adopted and is still being discussed (from time to time)



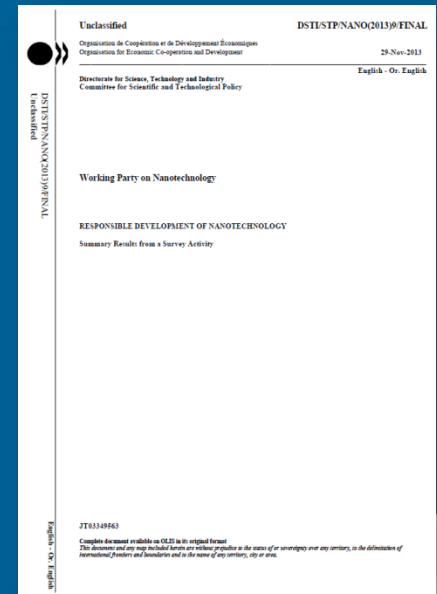


# History & Context (3): OECD on 'Responsible Nanotechnology'

- OECD (2013): Working Party on Nanotechnology (WPN): *Responsible Development of Nanotechnology – Summary Results from a Survey Activity*

**Definition:** Responsible development of nanotechnology: actions to stimulate the growth of nanotechnology applications in diverse sectors of the economy, while addressing the potential risks and the ethical and societal challenges the technology might raise.

- There is a **common objective** among [the 25 responding OECD WPN] delegations of **achieving socio-economic benefits** from the responsible development of nanotechnology,
  - 11/25: specific national or regional policies for the responsible development of nanotechnology [are] in place,
  - 9/25: nanotechnology is part of other responsible development policies,
  - 3/25: policies for responsible development of nanotechnology are under development.
- Biggest challenge to policy development and implementation: the cross-sectoral nature of nanotechnology





# History & Context (3): OECD on 'Responsible Nanotechnology'

- OECD (2013): Working Party on Nanotechnology (WPN): *Responsible Development of Nanotechnology – Summary Results from a Survey Activity*

**Definition:** Responsible development of nanotechnology: actions to stimulate the growth of nanotechnology applications in diverse sectors of the economy, while addressing the potential risks and the ethical and societal challenges the technology might raise.

## Overall Findings:

Policies for the responsible development of nanotechnology aim to:

- a. support research and/or business activities,
- b. implement effective legal or regulatory frameworks, in order to ensure that safety standards are met, and
- c. stimulate (public) debates on the place of science and technology in society by engaging the public on social and ethical issues.



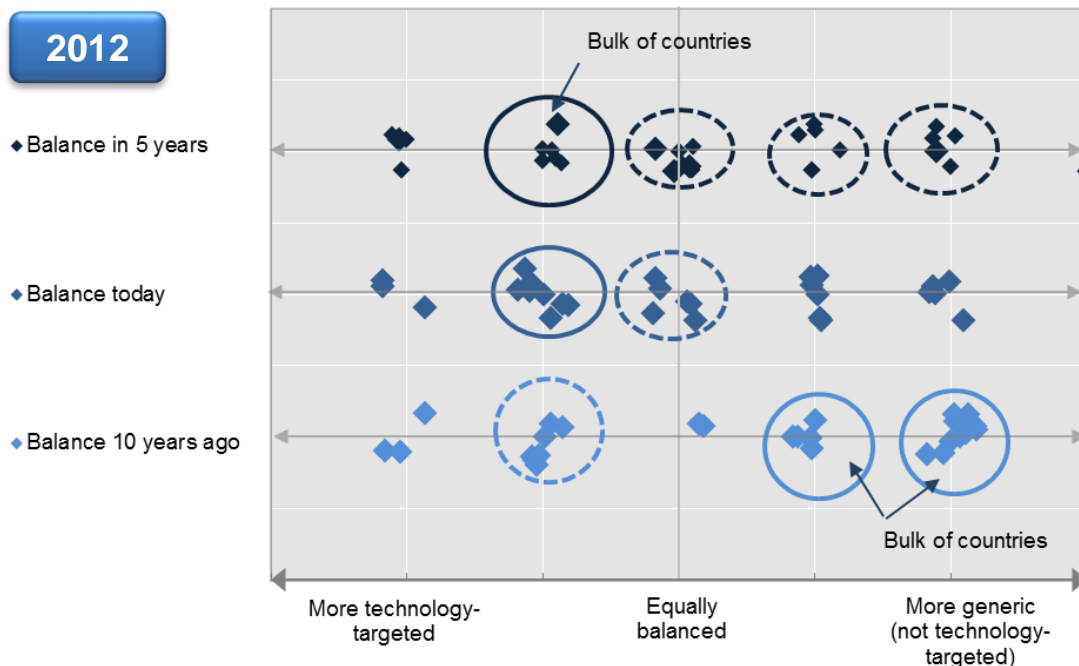
# History & Context (4): OECD on 'Nanotechnology Governance'

- OECD (2013): Working Party on Nanotechnology (WPN): *Policy Environments and Governance for Innovation and Sustainable Growth through Nanotechnology*

## Overall Findings:

- Approaches to the governance of nanotechnology vary significantly (between countries/regions and sectors)
- Policy-mixes are **increasingly technology-specific**

Changing balance in the policy mix for business R&D and innovation: **Technology-targeted versus generic instruments**





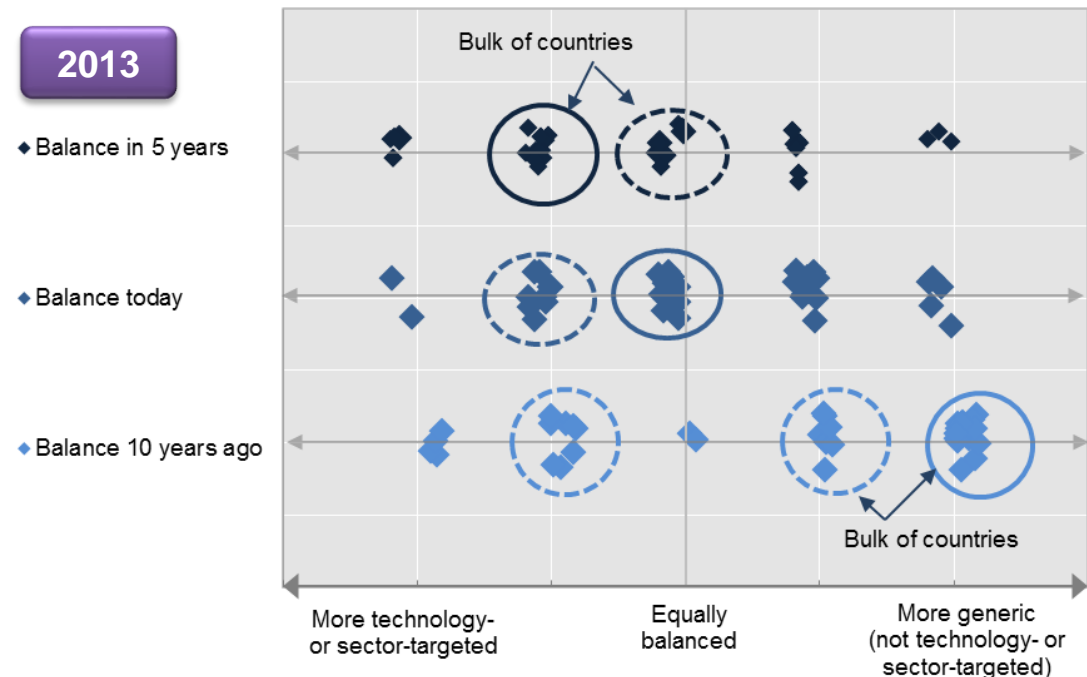
# History & Context (4): OECD on 'Nanotechnology Governance'

- OECD (2013): Working Party on Nanotechnology (WPN): *Policy Environments and Governance for Innovation and Sustainable Growth through Nanotechnology*

## Overall Findings:

- Approaches to the governance of nanotechnology vary significantly (between countries/regions and sectors)
- Policy-mixes are **increasingly technology-specific**

Changing balance in the policy mix for business R&D and innovation: **Technology-targeted versus generic instruments**

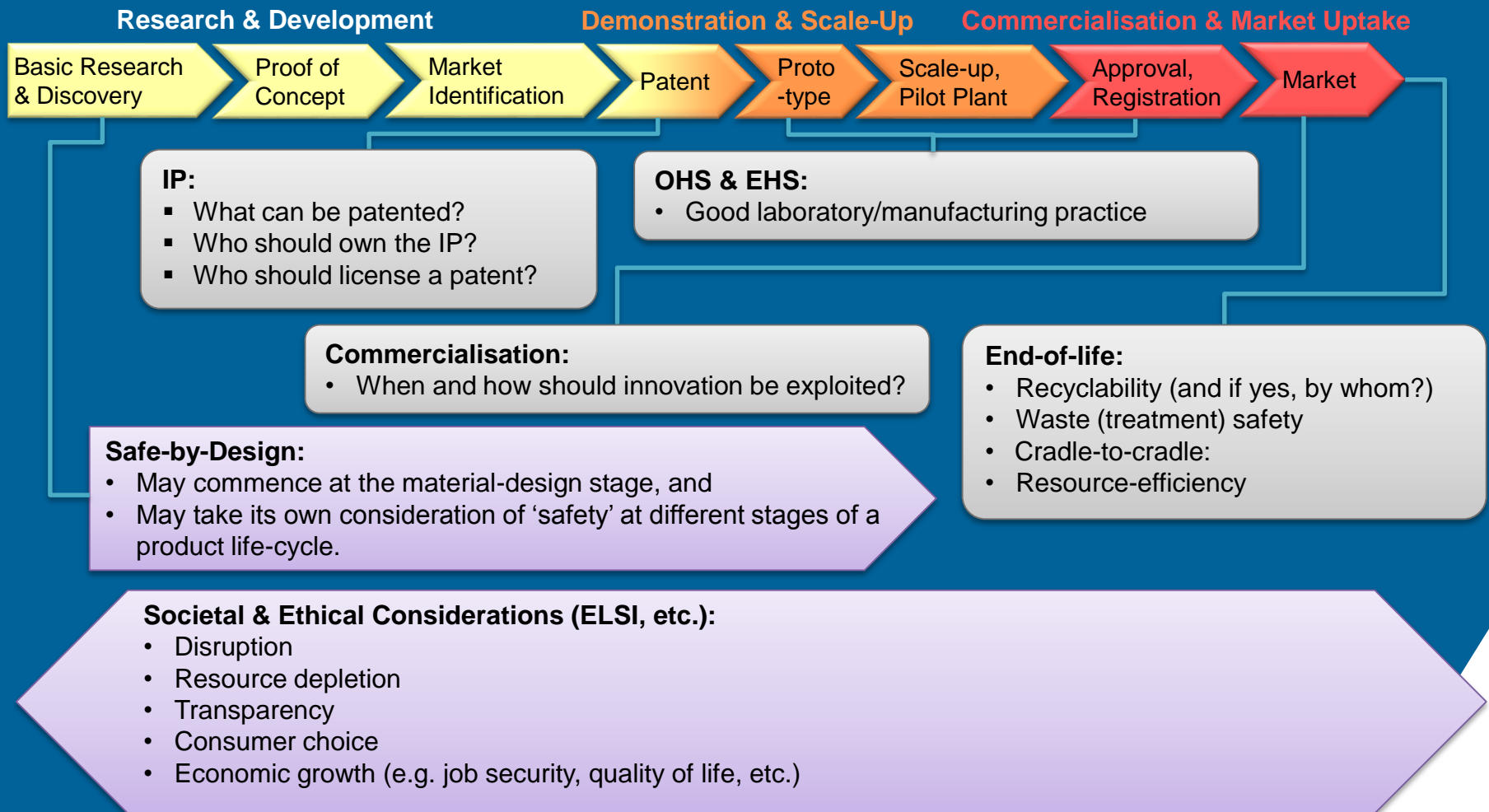






# Responsible Development of Nanotechnology in Practice

Along the innovation value chain, the concept of Responsible Development (of Nanotechnology) can take many different forms:





# OECD BNCT on Responsible Research and Innovation

BNCT: Working Party Biotechnology,  
Nanotechnology and Converging Technologies

... more information here:

<https://www.innovationpolicyplatform.org/oecd-working-party-bio-nano-and-converging-tech-bnct-0>

... and here:

<https://www.innovationpolicyplatform.org/project-emerging-technologies-and-brain-oecd-bnct>

## OECD Workshop Agenda

### Neurotechnology and Society: Strengthening Responsible Innovation in Brain Science



15-16 September 2016

Washington D.C., United States

**Purpose:** The purpose of this Workshop is to pool ideas and approaches, and promote coordinated efforts at understanding, and addressing, the science and society interplay in the course of brain research and the development of novel neurotechnologies. The Workshop will be attended by leading stakeholders and commentators from Asia, the Americas, Europe, and Oceania, with representatives drawn from the public and private sectors, leading research organisations and universities, national funding bodies, investors, civil society, and business.

**Objectives:**

1. Generate better understandings of the ethical, legal, social, regulatory, and economic aspects of emerging neurotechnologies;
2. Pool experiences about how relevant actors – scientists, policy makers, regulators, funders and civil society – are integrating societal values into brain science and neurotechnological development;
3. Discuss frameworks of governance and regulation that have been applied successfully or not;
4. Identify, and develop, fundamental lessons to guide actors, institutions, and policies aiming to better integrate science and society during research and technological development.

**Organisation:** The one-and-a-half day Workshop will be organised around five thematic sessions with two keynote presentations followed by moderated panel discussions.

The Steering Group of the Workshop consists of representatives from the European Commission, DG Research & Innovation; Arizona State University, United States; Department of Neuroscience, KU Leuven, Belgium; Department of Neuroscience; Ministry for the Economy, Industrial Renewal and Digital Affairs, France; National Academies of Sciences, Engineering, and Medicine, United States; National Institutes of Health, United States; Food and Drug Administration, United States.

The Workshop is being hosted by the National Academies of Sciences, Engineering, and Medicine at the National Academy of Sciences building in Washington, D.C., United States.



# Examples of 'Responsible Development of Nanotechnology' in this Session:

---

- *LICARA nanoSCAN - A tool for the self-assessment of benefits and risks of nanoproducts*
- *Determinants of Take-Off and Slow-Down of Innovation in a Situation of Uncertainty Regarding Environmental and Health Risks*
- *Supporting risk assessment of nanomaterials with quality-approved information - DaNa Literature Criteria Checklist*
- *Safer-by-Design and Financing? An Exploratory Approach of Private Financing of Nanotechnological Start-Ups*



# THANK YOU!

Steffi Friedrichs

Biotechnology, Nanotechnology and Converging Technologies

t: + (33-1) 85 55 60 27

e: [steffi.FRIEDRICHS@oecd.org](mailto:steffi.FRIEDRICHS@oecd.org)

Skype: steffifriedrichs