Multimethod wide stakeholder assessment of views and perspectives on nano-risk governance

Presented by Christina Benighaus, DIALOGIK
Contributors: Andrea Porcari (AIRI), Elisabetta Borsella (AIRI), Khara Grieger (North Carolina State University), Panagiotis Isigonis (UNIVE), Somik Chakravarty (R-Tech), Marie Louise Kirkegaard (Danish Technological University), Pete Kines (NRCWE) and Keld Alstrup Jensen (NRCWE)

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Stakeholder Profiling in caLIBRAte

Novelty of work compared to existing literature and surveys on stakeholder views on risk governance

• International panel (cosmopolitan study)

• Using mixed methods (qualitative and quantitative approach), comparing views of all types of stakeholder categories (mixed approach)

• Considering nanomaterials and all their application areas (not sector specific)
Stakeholder Profiling in caLIBRAte (cont.)

Novelty of work compared to existing literature on stakeholder views on risk governance

• Covering risk awareness, perception, assessment, management, transfer (insurance) and communication (risk governance cycle)

• Distilling needs, priorities and expectations for a Risk Governance framework for different stakeholder groups (stakeholder profiling)

• Up to date (new empirical study)
My knowledge of nanotechnology is ... (online survey)

<table>
<thead>
<tr>
<th>Level</th>
<th>Germany - Total n=1030</th>
<th>Denmark - Total n=1037</th>
<th>Spain - Total n=1034</th>
</tr>
</thead>
<tbody>
<tr>
<td>high 1</td>
<td>0,9%</td>
<td>2,4%</td>
<td>3,6%</td>
</tr>
<tr>
<td></td>
<td>3,6%</td>
<td>4,6%</td>
<td>6,1%</td>
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<td>2</td>
<td></td>
<td>10,5%</td>
<td>22,2%</td>
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<tr>
<td>3</td>
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<td>16,4%</td>
<td>22,5%</td>
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<tr>
<td>4</td>
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<td>18,4%</td>
<td>20,6%</td>
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<td>low 5</td>
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<td>58,1%</td>
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<tr>
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<td></td>
<td>44,2%</td>
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</tbody>
</table>
Level of knowledge of the different stakeholder groups (Delphi)

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**Industry**
- Expert: 35%
- Basic knowledge: 17%
- Intermediate understanding: 24%
- Skilled User: 24%

**Research**
- Expert: 47%
- Basic knowledge: 5%
- Intermediate understanding: 5%
- Skilled User: 43%

**Policy**
- Expert: 54%
- Basic knowledge: 0%
- Intermediate understanding: 38%
- Skilled User: 8%

**CSOs**
- Expert: 0%
- Basic knowledge: 16%
- Intermediate understanding: 17%
- Skilled User: 67%
Knowledge of Nanotechnology/Nanomaterials

- Level of public knowledge of nanotechnology is still low

- Industry, researchers, policy makers and informed public rate their level of knowledge middle to high.
**Nanotechnology has for me a … connotation (online survey)**

<table>
<thead>
<tr>
<th></th>
<th>Germany - Total n=1030</th>
<th>Denmark - Total n=1037</th>
<th>Spain - Total n=1034</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>positiv 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5,5% 9,8%</td>
<td>12,2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16,1% 26,3%</td>
<td>25,8%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>46,1% 50,7%</td>
</tr>
<tr>
<td></td>
<td>10,8% 11,2%</td>
<td>10,1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8,9% 10,8%</td>
<td>11,1%</td>
<td></td>
</tr>
<tr>
<td>negative 5</td>
<td>4,2% 11,2%</td>
<td>4,2% 11,2%</td>
<td></td>
</tr>
</tbody>
</table>
Public Connotation of Nanotechnology

- Nanotechnology has a **positive to neutral connotation** for public/society with positive effect on life

- Is a **solution for technical and/or social problems** and should support the development of the society

- But clear concern about the **safety of nanotechnology** for the society, environment, economy and individual and family health (public and workers’ health)
Perception of risks deriving from production, use and disposal of NMs and nano-products (Delphi)

scale 1-very low to 5-very high
## Level of knowledge on NMs and nano-risk perception (Delphi, Online survey)

<table>
<thead>
<tr>
<th></th>
<th>Industry</th>
<th>Researchers</th>
<th>Policy makers/Regulators/Insurers</th>
<th>CSO’s (Civil Society Organizations) (Delphi)</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of knowledge on NMs</td>
<td>3,72</td>
<td>4,37</td>
<td>4,16</td>
<td>3,53</td>
<td>1,91</td>
</tr>
<tr>
<td>Level of perception of EHS risks</td>
<td>2,8</td>
<td>2,97</td>
<td>2,48</td>
<td>3,72</td>
<td>2,75</td>
</tr>
<tr>
<td>Level of perception of social/ethical risks</td>
<td>2,36</td>
<td>2,53</td>
<td>1,9</td>
<td>3,4</td>
<td>2,93</td>
</tr>
</tbody>
</table>

**Color scale (from 1-very low to 5-very high)**

1 2 3 4 5
EHS and ELSA

- Majority of stakeholders are well aware of Environmental, Health and Safety issues (EHS) and Ethical, Legal, Social concerns/aspects (ELSA) posed by nanomaterials in all the application domains.

- CSO’s has general concerns about EHS risk and ELSA posed by NMs and nanotechnology development in all the application domains followed by public, researchers and industry.

- Worker health and the environment face the highest risks in relation to NM production.
Risk Perception Sectors (Delphi)

- Mechanical Engineering, machinery
- Equipment & instruments
- Textiles
- Paper
- Constructions
- (Food)-Packaging
- Agri-food

COSMETICS
- Medical devices
- Medicine and Health Care
- Security and defence
- Aerospace
- Transports

ENVIRONMENT
- Energy
- Electronics, optics and ICT

CHEMS & MATS

- CSOs (Civil Society Org.)
- Policy Makers/Regulators/Insurers/Risk Managers
- Research
- Industry
Purchase Intention – I would buy nano-related products (Public Online survey)

1: Textiles
2: Cosmetics
3: IT/Electronics
4: Household Appliances
5: Baby accessories
6: Food packaging
7: Foods
8: Cleaning / Care Products
9: Medical products
10: Building materials
11: Agriculture

Yes, in any case
No, under no circumstances

Germany
Denmark
Spain
Perception of nano-risks in industrial sectors and its effect on the market (Delphi, Online survey)

<table>
<thead>
<tr>
<th>Perception of potential nano-risks in industrial sectors</th>
<th>Industry</th>
<th>Researchers</th>
<th>Policy makers/Regulators/Insurers</th>
<th>CSOs (Civil Society Organizations) (Delphi)</th>
<th>Public (Survey)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,9</td>
<td>3,1</td>
<td>2,44</td>
<td>3,17</td>
<td>2,80</td>
</tr>
<tr>
<td>Effect of perceived uncertainty in the NM safety on their diffusion</td>
<td>3,41</td>
<td>3,33</td>
<td>2,8</td>
<td>3</td>
<td>2,76</td>
</tr>
</tbody>
</table>

*Color scale (from 1-very low to 5-very high)*

1 2 3 4 5
Purchase intention and uncertainty of potential risks

- Highest concern relates to the sectors of textile, food (packaging), agri-food, environment, chemicals & materials and cosmetics.

- Risk perception is greater for products that could get in direct contact with the body (e.g. cosmetics, food, agriculture).

- Perceived uncertainty on potential risks of NM is a limit to their penetration in the market – need of unbiased and trustable information, based on scientific evidence.
“Indicate the importance you attribute to risk assessment procedures as effective tools for diagnosis and management of risks deriving from production/use/disposal of NMs and nano products” (from the Delphi study).
Risk - Long-term monitoring of the impact of nanomaterials on public health and the environment is ...
(Online survey)

<table>
<thead>
<tr>
<th>Response</th>
<th>Germany - Total</th>
<th>Denmark - Total</th>
<th>Spain - Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 meaningful</td>
<td>44.8%</td>
<td>45.8%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>16.6%</td>
<td>21.1%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>32.8%</td>
<td>26.4%</td>
<td>30.9%</td>
</tr>
<tr>
<td>4</td>
<td>4.6%</td>
<td>2.4%</td>
<td>6.8%</td>
</tr>
<tr>
<td>5 not meaningful</td>
<td>4.6%</td>
<td>2.4%</td>
<td>3.2%</td>
</tr>
</tbody>
</table>

n=1030 for Germany, n=1037 for Denmark, n=1034 for Spain
Adequacy of current guidance and regulation for effective risk governance (Delphi)

**Industry**
- Yes: 18%
- Partially: 50%
- I do not know: 21%
- No: 11%

**Research**
- Yes: 0%
- Partially: 65%
- I do not know: 10%
- No: 25%

**Policy**
- Yes: 46%
- Partially: 31%
- I do not know: 8%
- No: 15%

**CSOs (Civil Society Organizations)**
- Yes: 0%
- Partially: 20%
- I do not know: 20%
- No: 60%
Consumer Information: "I have ... of the risks of nanotechnologies" (online survey)
Summary of the stakeholder profiling

- The idea of applying **risk assessment procedures in all stages of product development**, is gaining ground (also in industry)

- Majority of stakeholders (including the public) were aware of and agree on existing **gaps and barriers for risk governance of NMs**

- More robust and effective approaches to **risk governance** is needed

- Insufficiency and incoherence of the legislation all over Europe and a need for **specific guidelines for implementing current regulations**
Nanotechnologies - summary of findings

• seen as a **symbol of innovation** and progress,
• use could imply both **benefits and risks**
• highest risks perceived to **safety of workers, consumers and public health** and impact on **environment** in the use of NMs
• tendency towards a **convergence of opinions** between different stakeholders (industry, research organizations, policy-oriented organizations, general public)

• **lack of harmonized approaches** across regulatory domains
• **uncertainties** in the implementation of regulation
• further research is needed on **evidence-based approaches for risk analysis**
Key factors for risk governance

Risk governance/analysis should take into account:

- sector and type of application
- risk domains (e.g. workers, consumer health, end-of-life of product(s)),
- regulatory domains
- prior knowledge or background conditions in terms of public opinions and media coverage
- level of awareness or knowledge of SHs
- actual or perceived risk-benefit ratio of the specific product
- quality, reliability, and ease of understanding of available information such as e.g. EHS and NM characterization data, safety procedures, and product information