Compilation of suitable value chain case studies for demonstration of the caLIBRAte Nano Risk Governance Portal

Camilla Delpivo, Ana Sofia Fonseca, Arto Säämänen, Tomi Kanerva, Viitanen Anna-Kaisa, Nathan Bossa, Vicenç Pomar, Olivier Aguerre-Chariol, Olivier Le Bihan, Christophe Dutouquet, Isaline Fraboulet, Dave Spurgeon, Keld Alstrup Jensen and Socorro Vazquez-Campos

Objective

Value-chain case-studies (CS) contain data and contextual information allowing to describe the “story” of a nanomaterial (NM) and/or nano-enabled product (NEP) along its life cycle stages (LCS).

Within caLIBRAte, value-chain case-studies are collected and generated for two purposes:

• model performance testing and
• demonstration of the usability of the risk assessment (RA) models included in the caLIBRAte Nano Risk Governance Portal (NRGP).

New Value-Chain Case-Studies

Experimental efforts were focused on generating three new case studies through the product value chain by selecting scenarios of early stage to late R&D and product launch:

• Nano-enabled conductive material development Case Study,
• Silica aerogel panels for facades Case Study, and
• generating a comprehensive CS involving a fully implemented industrial application of NMs:
  • Indoor Paint Case Study.

This last CS greatly contributed in generating relevant data covering primarily the workplace exposure and also release of NMs during the use phase and the end-of-life and their fate in the surrounding environment.

Existing Value-Chain Case-Studies

Four existing value chain case studies have been selected from the previous gap analysis and quality evaluation performed according to the input parameters requested by the RA models:

• SANOWORK Case Studies: TiO₂ and Ag used for tile functional coating,
• Literature paper: “Occupational Exposure during Handling and Loading of Halloysite Nanotubes—A Case Study of Counting Nanofibers”,
• Literature paper: “Range-Finding Risk Assessment of Inhalation Exposure to Nanodiamonds in a Laboratory Environment”.

These CS contain common ES and data gaps, and supply user-oriented information.

Value-Chain Case-Studies

The CS selected and/or generated for demonstration purposes included both an example of a comprehensive CS, attempting to cover as many critical exposure scenarios (ES) along the life cycle stages as possible, and different examples that represent the type of ES and data sets that a final-user of the caLIBRAte NRGP could possess.

Example: Indoor Paint Case-Study

The table below shows the data available and generated for the Indoor Paint case study and their applicability to different models of the caLIBRAte NRGP.

<table>
<thead>
<tr>
<th>LCS</th>
<th>Synthesis</th>
<th>Manufacturing</th>
<th>Use</th>
<th>End of Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES available</td>
<td>851.1 Owing of TiO₂</td>
<td>851.2 Processing of TiO₂ powder</td>
<td>851.3 Instruction of simple TiO₂ paint</td>
<td>851.4 Waste water</td>
</tr>
</tbody>
</table>

Applicable RA models:

- Nano الى (
  • Indoor air, dust, 
  • Environmental 
  • Workplace exposure, 
  • Data-driven models)

- Silica aerosol case

- OGD expose

- EUDOS

Conclusions

For demonstration purposes, four existing and three new generated value chain case studies are provided as standard examples and inspiration for using the RA models included in the caLIBRAte NRGP. Value-chain case-studies provide not only information on model applicability and data needs but contain also indications to improve the usability of the RA models from the final-users, giving information on:

“which data are needed to run a certain RA model/tool” and

“which RA models/tools it is possible to use considering the data available from a specific exposure scenario”.

caLIBRAte is funded by the EU Horizon 2020 research and innovation program under grant agreement No 686239.