

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

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Objective

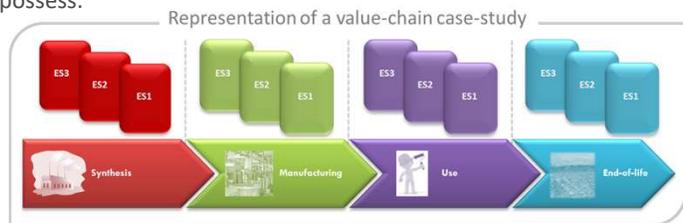
Value-chain case-studies (CS) contain data and contextual information allowing to describe the “story” of a nanomaterial (NM) and/or nano-enabled product (NEP) along its life cycle stages (LCS).

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).

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 NRGF could possess.



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 by 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.

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 NRGF.

TiO ₂ in Indoor Paint Case Study				
LCS	Synthesis	Manufacturing	Use	End of Life
ES available	ES1.1 Grinding TiO ₂	ES1.2 Pouring of TiO ₂ powder ES1.3 Incineration of empty TiO ₂ bag ES1.4 Waste water	ES1.5 Indoor use of paint	ES1.6 Landfilling of paint
Applicable RA models				
NanoSafer	<ul style="list-style-type: none"> • NM: size, shape, density, amount, solubility, SSA, dustiness, respirable OEL • Process/activity: production/use rate, time and frequency of task, emission rate • Contextual info: volume working rooms, air exchange rate, activity lev. in room 	<ul style="list-style-type: none"> ES1.2 • NM: size, shape, density, amount, solubility, SSA, dustiness, respirable OEL • Process/activity: production/use rate, time and frequency of task, emission rate • Contextual info: volume working rooms, air exchange rate, activity lev. in room 	<ul style="list-style-type: none"> • NM: amount, size, shape of NM used in the 3 point formulation • Process/activity: NM released from 3 point formulation during simulated use condition 	<ul style="list-style-type: none"> • NM: amount, size, shape of NM released in the 3 point formulation • Process/activity: NM released from 3 point formulations during simulated landfill disposal condition
Stoffenmanager nano				
GUIDEnano				
SUNDSS	<ul style="list-style-type: none"> • Process/activity: NM released from synthesis 	<ul style="list-style-type: none"> ES1.2 • Process/activity: NM released from manufacturing 		

LEGENDA: Data available, Missing information

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 NRGF. 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”.