

## The Safe-by-Design concept and its application in industrial innovation processes

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Supporting instrument / procedure:

- For industrial research, innovation, and development projects
  - Along the whole value chain
  - Driven and motivated by regulatory requirements
  - Not a risk assessment (RA)
  - Not a life cycle assessment (LCA)
- } But: **vital part** of the SbD process

## Goals of Safe-by-Design

- **Safer** nanomaterials and nano inspired products
- Application of the **precautionary principle**
- Identification of uncertainties and risk potentials **as early as possible**
- **Active management** for the reduction / elimination of risk potentials
- **Transparency** regarding safety relevant data for workers, consumers, environment

# Safety aspects and design aspects of SbD leading to a balancing of use, cost, and safety / risk

- Regulations
- Risk Assessment & LCA
- Management processes

- Functionalities
- Material databases

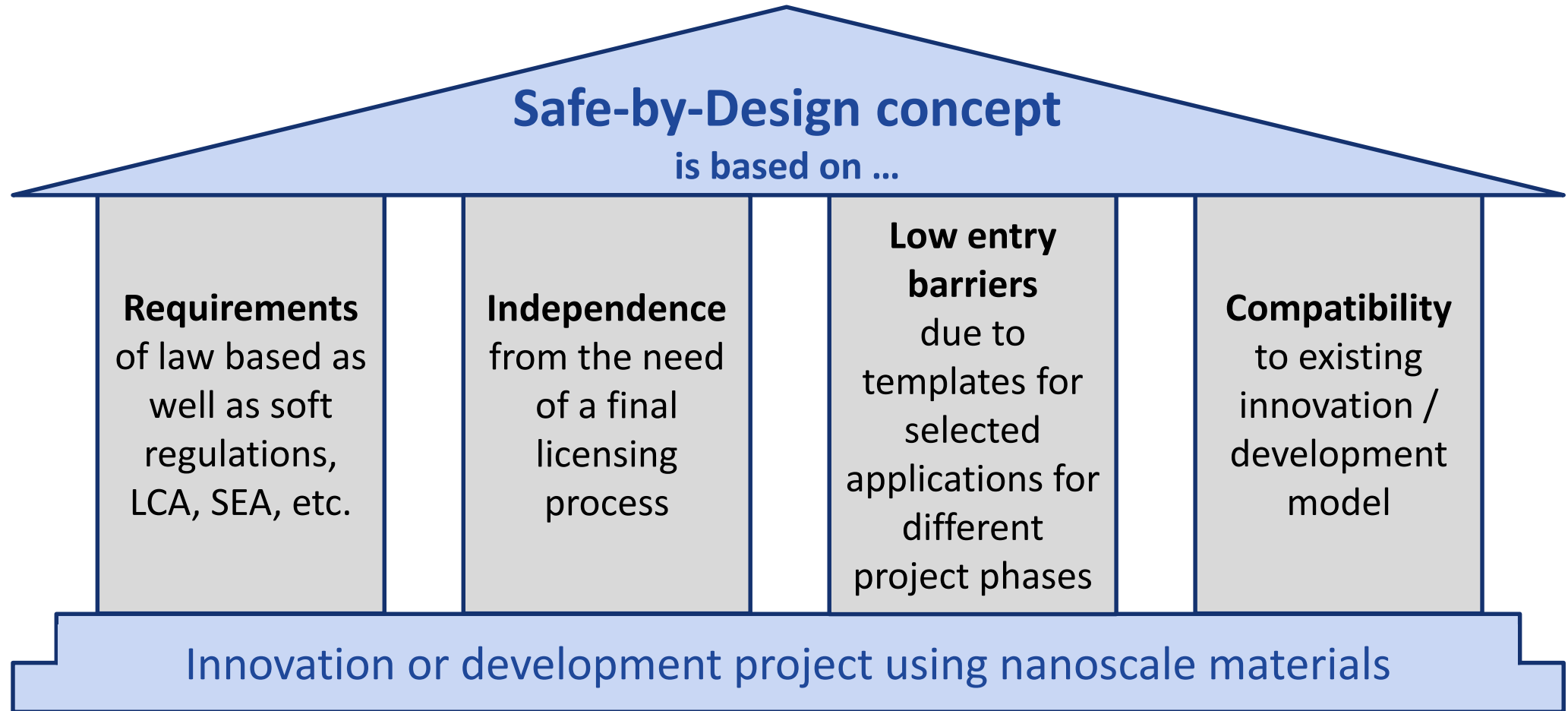
Safe - by - Design

**Benefits**  
(which information is needed in order to describe the use / benefit)

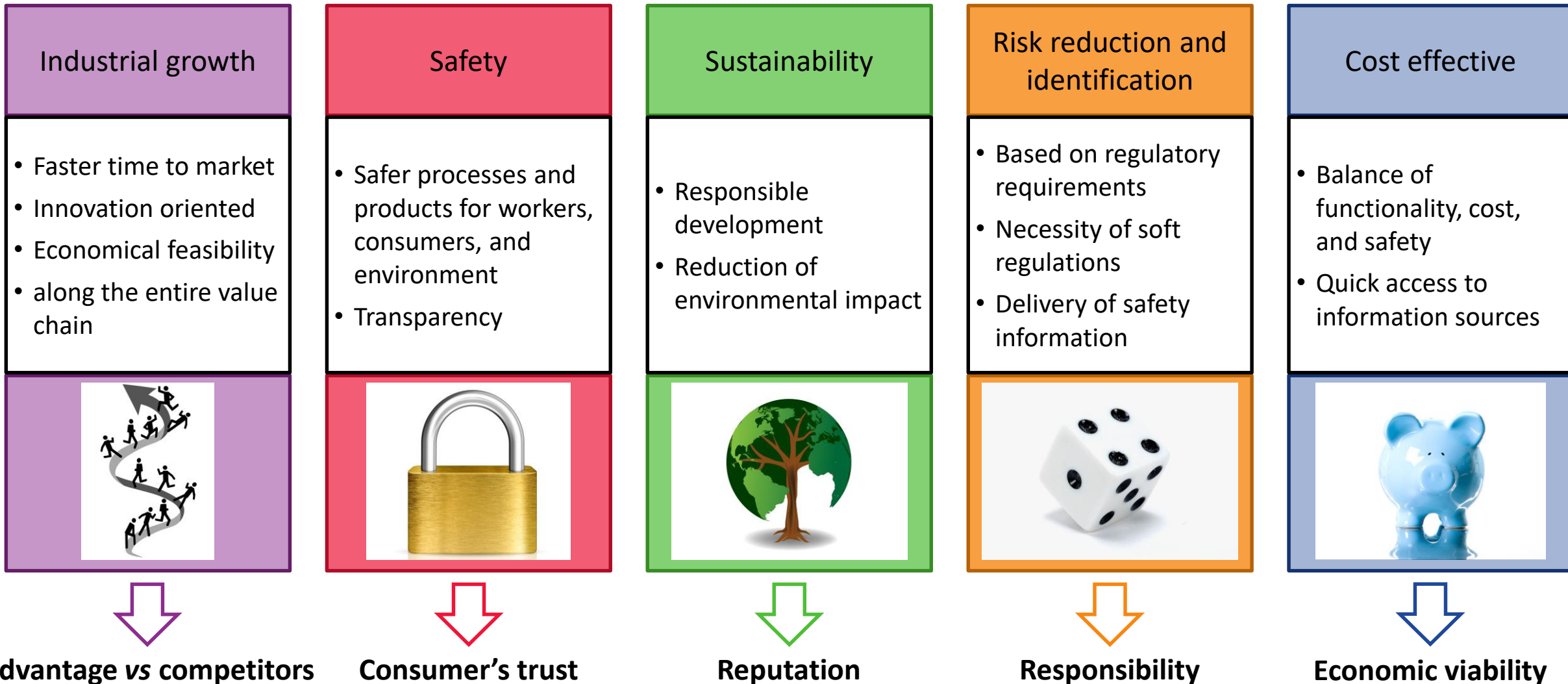
**SbD**  
is balancing

**Safety / risk**  
(Which information is needed, what are the thresholds, in order to yield the desired safety requirements)

**Cost**  
(What can be the investments into the use / functionality in comparison to the risk reduction)



## Why does your company need SbD?



Industrial growth



Safety



Sustainability



Risk reduction and identification



Cost effective



**How?**

### Safe-By-Design Implementation Platform

- Easy/user Friendly web-based Platform
- Management based on Project Phases
- Phase specific Safety Dossier based on Regulation
- Customized outputs based on Stakeholder requirements
- Go/no Go criteria per Phase
- Transparency of Safety Information



## Industrial companies

(Safety Profile of nanomaterials and products;  
Support of the Corporate Social Responsibility;  
Code-of-Conduct)

## Innovation promoting agencies

(Realisation of safety relevant requests for  
fund raising)



## Research and development

(Support by the Inventory of safety  
relevant concepts, tools, and data bases)

## Society

(transparency ⇒ trust)

## Regulation authorities and agencies

(«Regulators prepared for innovation»)

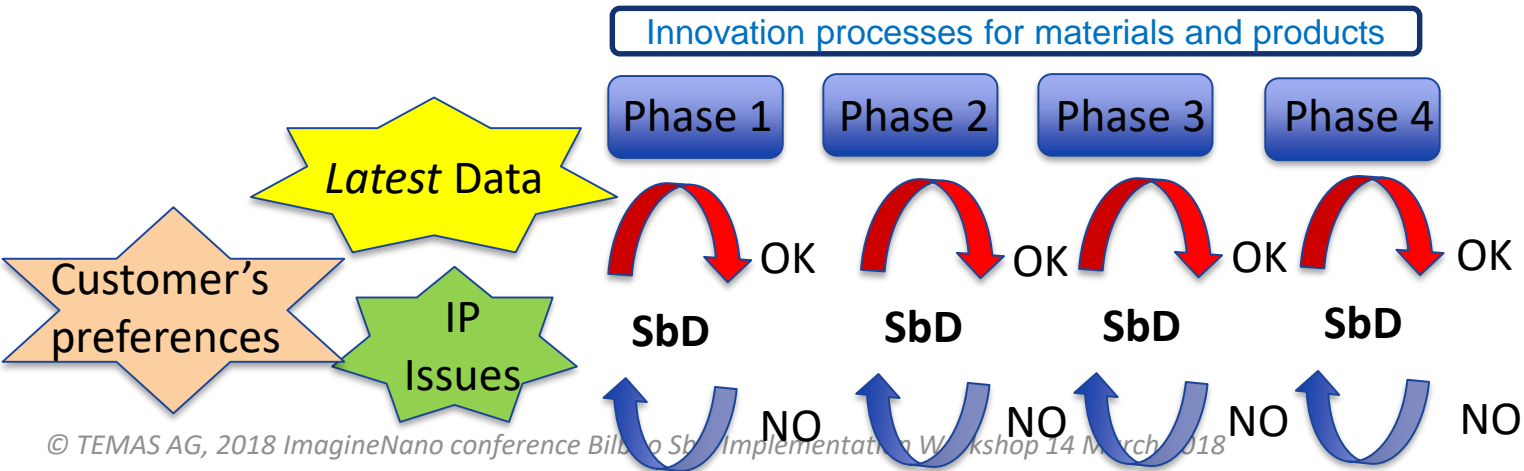
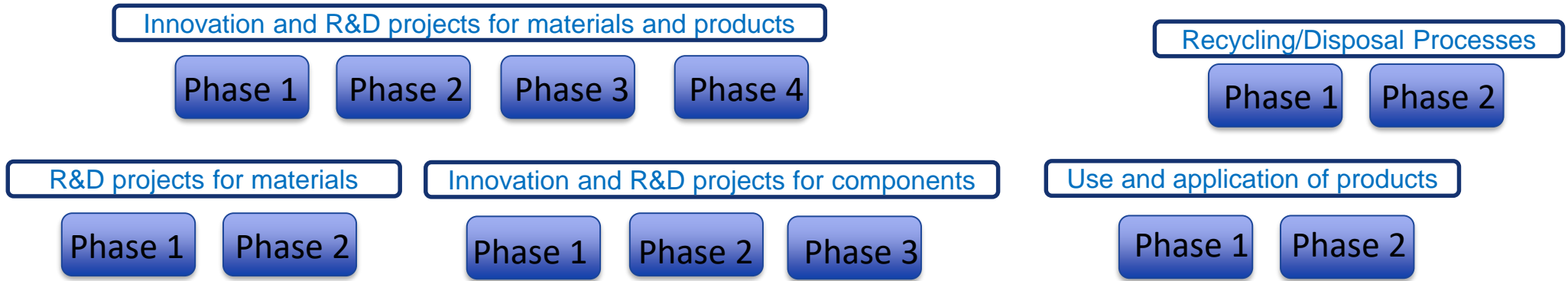


# SbD is used for EVERY SINGLE project along the Innovation

Innovative Product Life cycle



Industrial innovation and R&D projects



*Safer MNM products and processes*



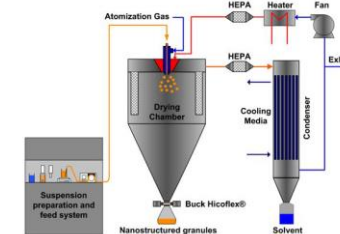


Marketing in Europe



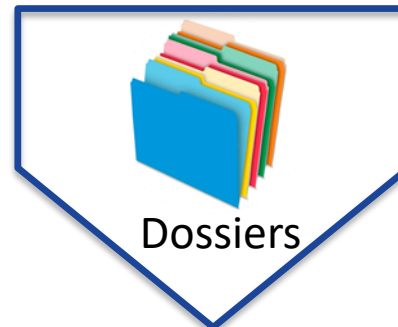
- Parameters
- Dossiers
- Updates

Industrial Processes



- Regulation
- Risk Assessment
- Standards

Selection of safer material

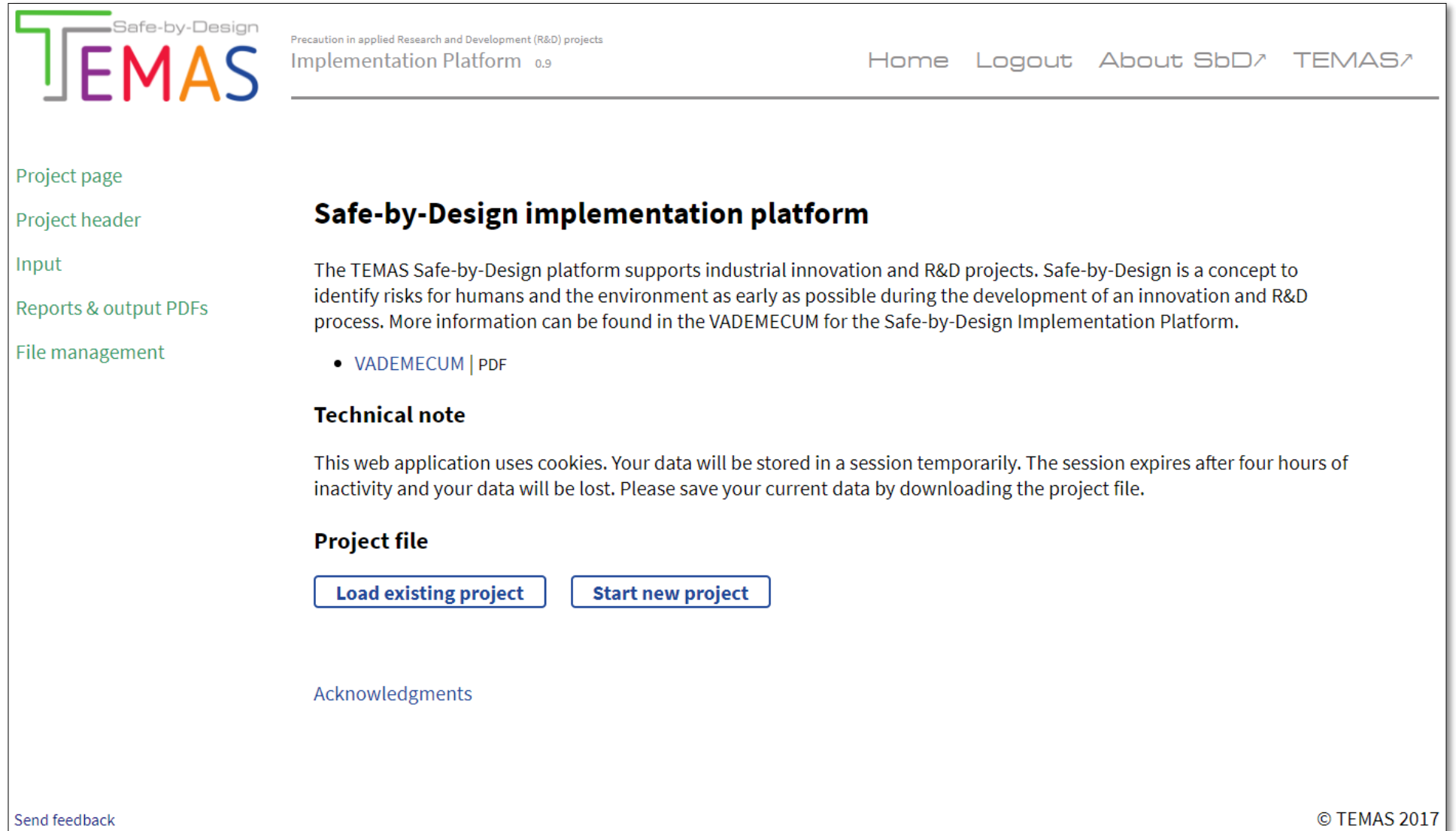


- Safety profile overlay
- Reference vs current data information

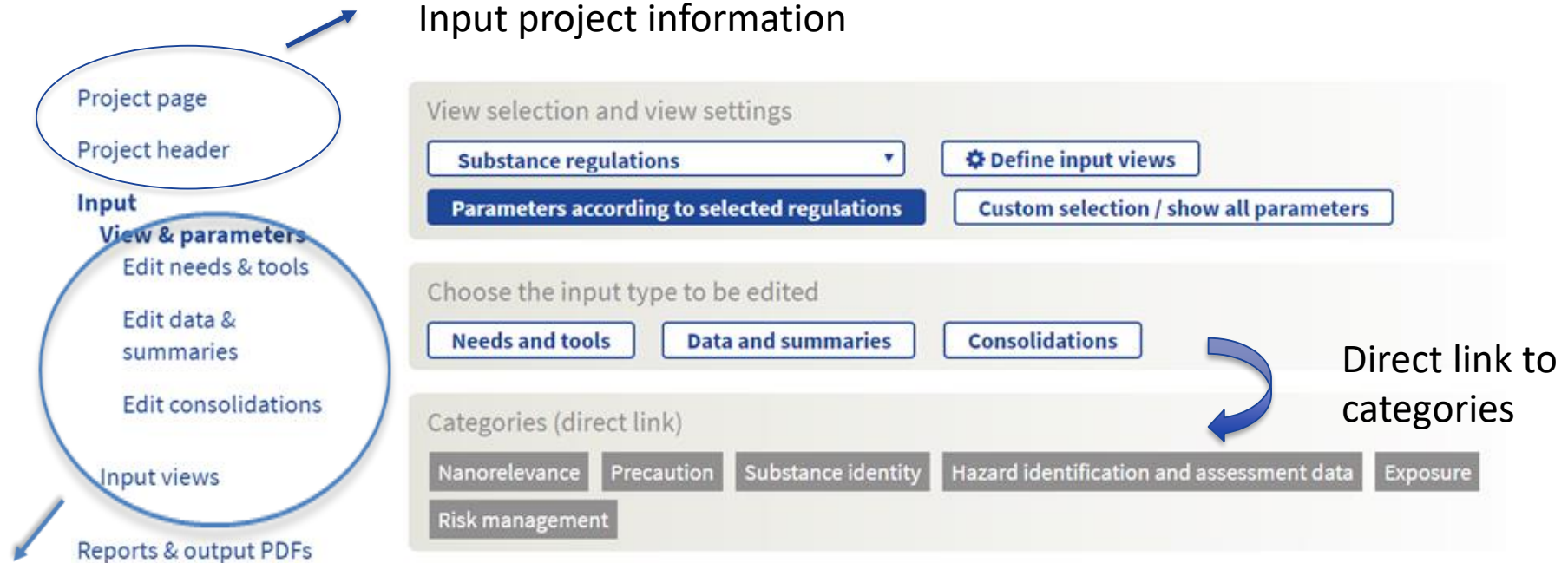
<https://temas.taglab.ch/SbDimplementation/index.php>

Live demonstration of the beta version (V0.9)

[info@temas.ch](mailto:info@temas.ch)



The screenshot shows the web application interface for the TEMAS Safe-by-Design Implementation Platform. The header includes the TEMAS logo, the text "Safe-by-Design", "Precaution in applied Research and Development (R&D) projects", and "Implementation Platform 0.9". Navigation links for "Home", "Logout", "About SbD", and "TEMAS" are visible. A sidebar on the left lists menu items: "Project page", "Project header", "Input", "Reports & output PDFs", and "File management". The main content area features a heading "Safe-by-Design implementation platform" followed by a descriptive paragraph and a link to "VADEMECUM | PDF". Below this is a "Technical note" section with a warning about cookies. At the bottom of the main area are two buttons: "Load existing project" and "Start new project". A footer contains "Send feedback" and "© TEMAS 2017".



Parameters and information

[Project page](#)

**Project header Information**

[Project phases](#)

[Regulations](#)

[Data input](#)

[Reports & output PDFs](#)

[File management](#)

## Project header information

You can edit the project information any time.

Project name	Nano Silver as anti-fouling agent in construction plastics: Pure powdered Nano Silver
Project family (optional if adequate)	Nano Silver as anti-fouling agent in construction plastics
Company	TEMAS AG
Responsible person	Max Mustermann
Classification with respect to standards and regulations (List all relevant standards and regulations for the project)	<div style="border: 1px solid #ccc; padding: 5px; background-color: #f9f9f9;">           Construction standards (e.g. SIA norms in CH)            Biocide regulations            REACH (ChemV in CH)            Laws such as the BImSchG regulation emissions into the environment (in this case biocides via leaching/washing out)            Occupational health regulations         </div>
Status of the project	New <span style="font-size: 0.8em;">▼</span>
What is developed (objectives of the project)	<input checked="" type="checkbox"/> Product <input type="checkbox"/> Process <input checked="" type="checkbox"/> Materials <input type="checkbox"/> Technology
Value chain	Select all   Deselect all <input checked="" type="checkbox"/> R&D <input checked="" type="checkbox"/> Production process <input checked="" type="checkbox"/> Further processing <input checked="" type="checkbox"/> Formulation <input type="checkbox"/> Packaging <input type="checkbox"/> Transport <input type="checkbox"/> Use <input checked="" type="checkbox"/> Recycling

[Send feedback](#)

Project page

Project header

Information

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Name and characterize the different phases of the project.

## 1. Phase

Title

Application scoping of Nano Silver in construction plastics

Characterisation of the phase

Each plastic used for construction purposes has to be examined for the usefulness of biocide application, i.e. whether fouling is an issue or not.

delete phase 1

## 2. Phase

Title

Theoretical Investigation on the Formulation and Application

Characterisation of the phase

Different forms (e.g. sizes) of powdered Nano Silver  
Different forms of applications / formulations  
Different plastics

delete phase 2

## 3. Phase

Title

Laboratory phase I: Investigation of Nano Silver in construction plastics

Characterisation of the phase

The detailed content of this phase will be determined after the first 2 conceptual phases

Project page

Project header

Information

Project phases

**Regulations**

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Information

Project phases

**Regulations & target groups**

## Project regulations and target groups

Select the regulations and target groups that are applicable for your project.

Regulations

Select all | Deselect all

- REACH (Substance)
- CH ChemV (Substance)
- Cosmetics
- Pesticides (Pesticides)
- Biocides
- KLASSE I (Medical Devices)
- Occupational

Non-regulatory categories

Select all | Deselect all

- Application, functionality, property (complementary materials)
- Chemical safety documentation
- Sustainability analysis & Life cycle analysis (LCA)
- Management processes
- Balancing of benefits, costs, and risks/safety
- Governance aspects

Target groups **INDUSTRY**

Select all | Deselect all

- Research and development
- (Up-stream) supplier
- Producer
- Importer
- Distributor
- Formulator

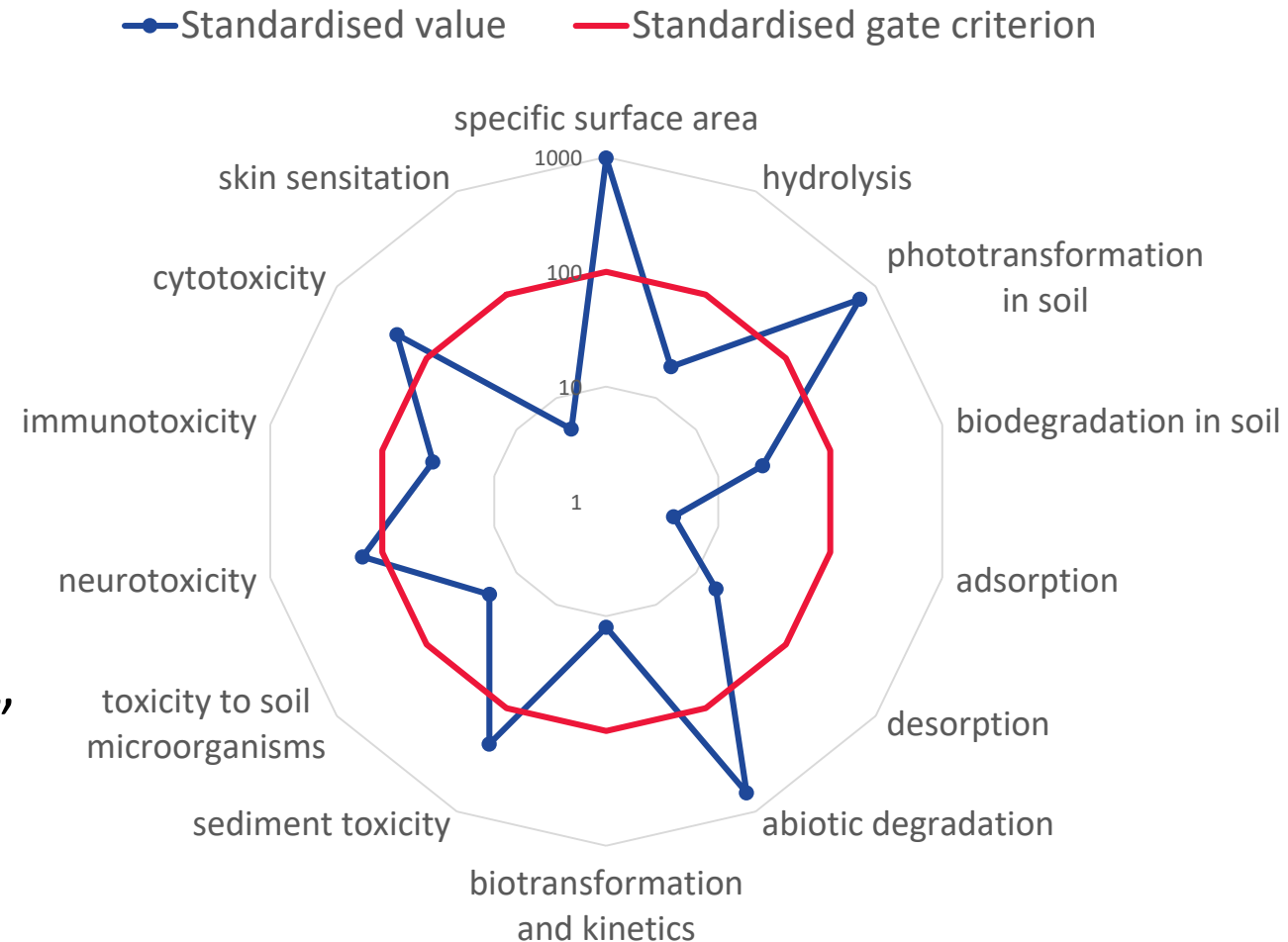
## Content:

- Creation of **project-specific documents** for selected target groups
- **Structuring** of all safety relevant data and information

## Goal and purpose:

- Support of the **management processes**
- **Exchange** of information
- **Standardised overview** of the “gate-pass” criteria compared to the elaborated values

## SP1: Phase 2, Physchem properties



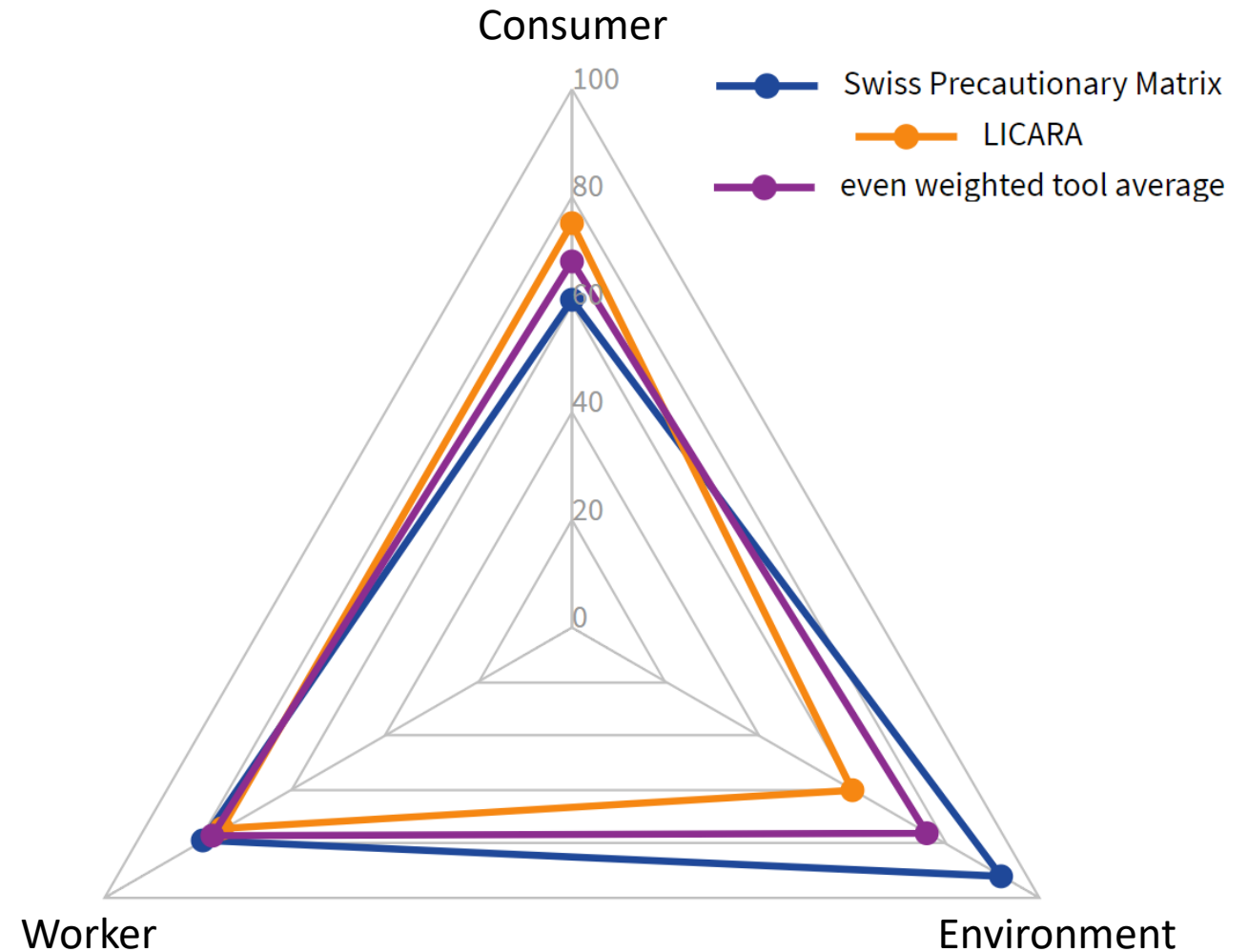


## Content & purpose:

- Fulfilment of the precautionary principle by provision, application and elaboration of the output of control banding tools
- Evaluation and determination of risk hazard, exposition und risk

Figure:

Analysis and comparison of the hazard effect of a nanomaterial on consumer, environment, and worker, using LICARA<sup>1</sup> and the Swiss Precautionary Matrix (PCM)<sup>2</sup>



1. T. van Harmelen *et al.*, "LICARA nanoSCAN - A tool for the self-assessment of benefits and risks of nanoproducts," *Environ. Int.*, vol. 91, pp. 150–160, 2016.

2. J. Höck *et al.*, "Guidelines on the precautionary matrix for synthetic nanomaterials," *Fed. Off. Public Heal. Fed. Off. Environ. Berne*, 2008.

THANKS FOR YOUR ATTENTION!

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