



TRANSDISZIPLINÄRE FORSCHUNG ZUR ENTSORGUNG
HOCHRADIOAKTIVER ABFÄLLE IN DEUTSCHLAND

Optimizing the safety case through transdisciplinary research?

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... and the TRANSENS TAP SAFE team

TRANSENS: A transdisciplinary research project

- 1st large-scale transdisciplinary project on nuclear waste management in Germany
- 2019–2024, 16 partners from Germany and Switzerland
- Transdisciplinary research:
 - Methodology-driven scientific principle
 - Contributions to solving a societal problem (here: HLW / SNF management in Germany)
 - Involvement of non-specialists and actors from practice ...
 - ... and today: **you, the workshop attendees** 😊

TRANSENS TAP SAFE: Theme corridor

- One of four Transdisciplinary Working Packages (TAP)
- Safety Case: Established tool and basis for decision-making in repository programmes (based on a variety of safety assessments)
- But also: Criticism of approaches, procedures and standards, which can become relevant in the German site selection process
- Research question:
Can a **transdisciplinary approach** contribute to an **optimisation** of the Safety Case?

Safety Case: Methodology & report compilation

- Supporting decisions in repository programmes by providing „multiple lines of evidence“
- Addressing technical feasibility, operational and post-closure safety
- Often: subject to peer reviews
- Today: focus on post-closure (long-term) safety

Long-term Safety Cases include:

- System description
- Derivation of scenarios
- Computer simulations, resulting in „indicator values“
- Synthesis, including:
 - Result compilation
 - Recommendations about how to proceed, including ways to address uncertainties

Our plans for today (1/2)

- Four topics, four transdisciplinary formats
- Objectives:
 - For you: to become familiar with transdisciplinary research
 - For us: to gain insight from you, ...
... your experiences, your knowledge, your values, your perspectives

Our plans for today (2/2)

Topics & transdisciplinary formats

1. Digital Safety Case – „sailboat“ format
2. **F**eatures, **E**vents & **P**rocesses – format „open silent discussion“
3. Benefits of extended peer communities – format “design thinking”
4. Indicators – format „anonymous silent discussion“

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Topic #1: Digital Safety Case

- On paper, the Safety Case is an unwieldy stack of books
- Digital formats provide many opportunities for

- data accessibility
- structure
- review
- ...



What we would like to know from you:

- What goals we could achieve by switching to a digital SC?
- What applications become possible?
- What hinders implementation?
- What are future risks?
- Which actors are involved?

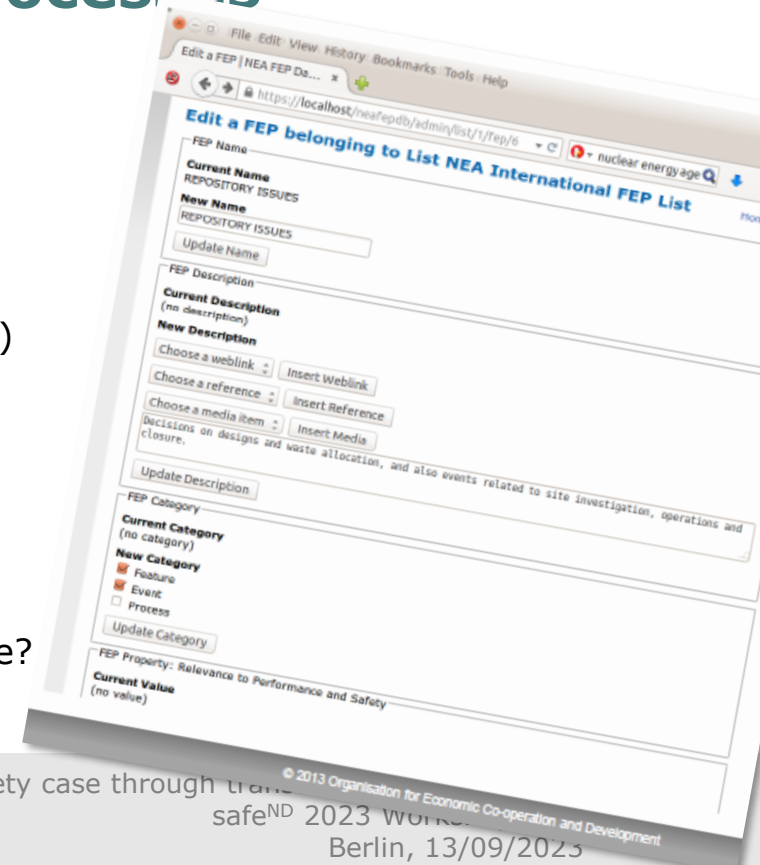
Topic #1: „sailboat“ format

- Brainstorming Method – quickly collects many ideas / inputs
- Creates a snapshot of the current situation
- Often used as a retrospective
- Visual template provides structure
- All individual inputs will be „heard“
- Trends may emerge
- Can be used as starting point to formulate action points



Topic #2: Features, Events & Processes

- System description:
 - „How does it look like?“
→ features (porosity, temperature, ...)
 - „What might happen?“
→ (short-term) events (earthquakes, ...)
 - „How might it evolve?“
→ (longer-lasting) processes (fluid flow, corrosion, ...)
- FEPs and their interactions:
 - Essential for constructing scenarios and computer simulations
 - Collected and processed in databases
- Our questions to you:
 - What can, what cannot FEP databases do and achieve?
 - Measures to overcome their deficiencies?



Topic #2: Format „open silent discussion“

- As you might have experienced, oral discussions tend to be dominated by certain personality types
- As a consequence, not always the soundest arguments will „win“
- A way to empower the rather silent, thoughtful personalities:
 - Keep your mouth shut, but ...
 - ... express your thoughts by putting them down in writing on the flipchart
 - ... look at what others wrote. You might wish to supplement or comment!
 - **BUT again: Keep your mouth shut** 😊

Topic #3: Extended Peer Reviews

- Can a specific Safety Case - complementary to classical peer reviews - be improved through reviews by extended peer communities?
- Reviews performed by persons outside the professional Safety Case community, e.g. archaeologists or industrial risk management professionals
- To obtain content-related and/or methodical impulses
- In order to strengthen the quality, legitimacy and acceptance of the Safety Case
- Research results from TRANSENS and a number of arguments based on scientific literature speak in favor of extended peer reviews.
- But: How to implement such an extended peer review?

Topic #3: Format „Design Thinking“

- Development of a prototype for an extended peer review
- Implementation based on the „Design Thinking“ tool for transdisciplinary research
- Design of an extended peer review of the Safety Case
- Developing a narrating backwards from the successful outcome: How did it come about?



Topic #4: Indicators

- In Safety Cases, many computer simulations are used, e.g. for ...
 - Corrosion processes
→ Evolution of container outer shell
 - Radionuclide migration with groundwater
→ Radionuclide concentrations in wells, lakes, rivers, ...
 - Radionuclide transfer & exposition
→ dose to humans
- We consider the simulation outcomes as **indicators** for safety-related **messages**, e.g.:
 - The container remains tight
 - The radionuclide concentrations or doses are acceptable

- Questions to you: Please ...
 - **name** one (or more) indicators that should be used to assess the (long-term) safety of a nuclear repository,
 - and **rate** their suitability for this purpose.
 - What considerations influenced your rating(s)?

Topic #4: Format „anonymous silent discussion“

- As you might have experienced, oral discussions tend to be dominated by certain personality types
- As a consequence, not always the soundest arguments will „win“
- A way to empower the rather silent, thoughtful personalities:
 - Keep your mouth shut, but ...
 - ... express your thoughts by putting them down in writing **on individual sheets**
 - ... **circulate** the sheets and look at what others wrote.
You might wish to supplement or comment!
 - **BUT again: Keep your mouth shut** 😊

Looking forward to the exchange with you!

Questions?

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After the coffee break...

Topic	Format
Digital Safety Case	Sailboat
Features, Events and Processes	Open Silent Discussion
Extended Peer Reviews	Design Thinking
Indicators	Anonymous Silent Discussion