



# The evaluation cascade

## How to get from quality dimensions to indicators and measurement

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## ■ Structure

### **How to get from quality dimensions to indicators and measurement**

- Climate services and co-creation
- Literature survey
- Results and their application
  - Evaluation of either process or result
  - Evaluation cascade
- Preliminary analysis
- Outlook

## ■ Climate services and co-creation



*„The development of climate services (...) requires a transdisciplinary approach of co-design, co-development and co-evaluation“*

European Commission (2015):  
Roadmap for Climate Services

- Products are being developed in **cooperation with the customers**
- **Integrated research** of science and practice
- Climate services very often develop their products in co-creation (Mauser 2013)
- Closer look to all the co-activities and the transdisciplinary research mode to improve product development in climate services

## ■ Literature survey

### Key questions, method of the survey

Which systems can be established in order to ....

... evaluate the **processes** of co-creation of knowledge?

... evaluate the **results** of co-creation of knowledge?

... evaluate the **impact** of transdisciplinary research projects?

Survey is overarching **all different research fields**

Mixed **methods**:

1) Keywords

2) snowball sampling

## ■ Literature survey

### Search results from different fields

50 publications can be found by entering the different key words, originating from different scientific fields:

1. Epistemology (17 articles)
2. Health (9 articles)
3. Sustainability and ecology (18 articles)
4. Technology (3 articles)
5. Urban studies (3 articles)
6. Others (0 articles)

### 50 search results by key words





# Results and their application

# Evaluation of either process or result

## Process of co-creation

### Three-stage process of R & D to be evaluated

#### Problem identification and structuring

Structuring of the issue, formulating the research question, common understanding of the problem

#### Dealing with the problem

Research and collaboration process itself

#### Implementation

Translation of the results to target group, embedding the results in respective setting

## Final product, result of co-creation

### Evaluation in three dimensions

#### Output

Products, results and services

Example

#### Outcome

The likely or achieved short-term and medium-term effects of co-development outputs

#### Impact

Positive and negative, primary and secondary long-term effects produced by R & D, directly or indirectly, intended or unintended

## ■ Evaluation cascade

Quality dimensions have to be made operational. A cascade from very general dimensions to very detailed measurement methods is agreed upon in nearly all literature contributions.



Our literature survey provided dimensions, criterias, and indicators. In the further presentation we added methods and ideas for measurement as examples to better illustrate the idea of the evaluation cascade.



## ■ Evaluation cascade

### Phase of problem identification and structuring

Dimension	Criteria (examples)	Indicator	Methods
Systemic quality	<ul style="list-style-type: none"> <li>• Understanding of systemic context and factual interdependencies</li> <li>• Clear problem definition and focus,</li> <li>• Societal relevance</li> </ul>		
Scale spanning quality	<ul style="list-style-type: none"> <li>• Constructive selection of participants</li> <li>• Consideration of different scales of the problem (temporal, spatial, social)</li> </ul>	<ul style="list-style-type: none"> <li>• Stakeholder Analysis</li> </ul>	Check of project documentation
Prospective quality	<ul style="list-style-type: none"> <li>• Variability of goals</li> <li>• Space for reflection, iteration, flexibility in changing directions</li> </ul>		

## Phase of dealing with the problem

Dimensions	Criteria (examples)	Indicators	Methods
Context specific quality	<ul style="list-style-type: none"> <li>• Relation to concrete problems</li> <li>• Space for reflection and self-assessment</li> <li>• Handling of cognitive boundaries</li> </ul>		
Integrative quality	<ul style="list-style-type: none"> <li>• Setting the scene for co-production of knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• Enough possibilities for involvement</li> </ul>	<ul style="list-style-type: none"> <li>• Interviews of project participants</li> </ul>
	<ul style="list-style-type: none"> <li>• Recognition of all kinds of knowledge and different normative systems</li> <li>• Transparency of mutual expectations</li> <li>• Transparency of different roles</li> </ul>		
Method-based quality	<ul style="list-style-type: none"> <li>• Accountable, transparent generation and evaluation of knowledge</li> <li>• Professional planning and management</li> <li>• Achievement of joint problem ownership</li> <li>• Organizational support</li> </ul>		

# ■ Evaluation cascade and its application

## Evaluation of results: Output and outcome

Dimension	Criteria	Indicator	Methods
Quality of output	<ul style="list-style-type: none"> <li>• Multiplicity of scales, wide-ness, broadness, depth</li> <li>• Availability, visibility</li> <li>• Principel usability, manageability</li> <li>• Elaboration (science, methods)</li> <li>• Originality, innovation</li> <li>• Potential for further development, connectivity</li> </ul>		
Quality of outcome	<ul style="list-style-type: none"> <li>• Real use, application, performance</li> <li>• Clients' satisfaction</li> <li>• Potential for transformation, effect of learning</li> <li>• Dissemination, extension, perception</li> <li>• Utilisation (patents, licences)</li> </ul>	<ul style="list-style-type: none"> <li>• Broad, depth, and way of usage</li> </ul>	<ul style="list-style-type: none"> <li>• Users' survey</li> </ul>

Example

# Evaluation cascade

Example

## Evaluation of results I: Outcome

Dimension	Criteria	Indicator	Methods
Quality of outcome	<ul style="list-style-type: none"> <li>Real use, application, performance</li> </ul>	<ul style="list-style-type: none"> <li>Broad, depth, and way of usage</li> </ul>	<ul style="list-style-type: none"> <li>Users' survey</li> </ul>

### Questions related to the real use of products and services:

Do you use the new product XY?	0 yes	0 sometimes	0 no
How long do you use it per day?	0 5 hours	0 2 hours	0 0,5 hours
Do you use all provided features?	0 yes	0 sometimes	0 no
Is it easy to handle?	0 yes	0 in some aspects	0 no
Does it facilitate your work?	0 yes	0 sometimes	0 no
How do you judge the overall relevance of the product?			

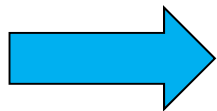
## ■ Preliminary analysis

- Climate services can benefit a lot from other research fields in terms of transdisciplinary methodologies and evaluation
- Literature provides a broad set of **criteria** but only few **indicators** and even less quantitative measurements
- **Evaluation of impact** is being discussed very **rarely**
- Following literature, an evaluation cascade and some pattern of a matrix can be generated, but in terms of evaluation methods and measurements **new development is necessary** to get a step further
- No overall scheme, but selection of individual set of indicators to be chosen **specifically for each product/project** and evaluation process
- The evaluation scheme of the prospective project should follow the guiding principles of TDR as well as the prospective goals of the specific project

## ■ Outlook

### Open tasks

- Evaluation of outcome and impact only makes sense a few months or even years later – funding agencies should provide enough time for evaluation or allow for a subsequent evaluation phase
- Design of an evaluation framework is needed, that is operational (could also be a transdisciplinary process)
- Development of appropriate (and measurable) indicators, where they are still missing



A challenge for the whole community that applies co-creation methods,



Work-in-progress, being completed together as a community effort

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# Thank you!

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