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# INTERACTIVE VISUALIZATIONS FOR THE ACCEPTANCE DIALOGUE IN THE DEVELOPMENT PROCESS OF COMPACT POWER POLES

ENERGY AND SOCIETY IN TRANSITION: 2ND INTERNATIONAL CONFERENCE  
ON ENERGY RESEARCH AND SOCIAL SCIENCE – ERSS 2019

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# AGENDA

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1. Motivation
2. Development process – method acceptance study
  - 1st step: Preparation
  - 2nd step: Citizen participation
    - ✓ Study design
    - ✓ Creation of the visualizations
    - ✓ Implementation of the study
    - ✓ Evaluation
  - 3rd step: Realization
4. Summary
5. Further work

# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 1. Motivation

- Increased use of renewable energies for supply and availability with electrical energy necessary
- Requirement: the expansion of electricity grids and the upgrading of existing power lines
- **Challenge:**
  - Expansion and upgrading is often done in populated and scenic areas
  - Population and stakeholders can hardly evaluate the impact on their personal environment → fear and resistance
  - Transmission tower design and stranding are basic visual influencing drivers



# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 1. Motivation

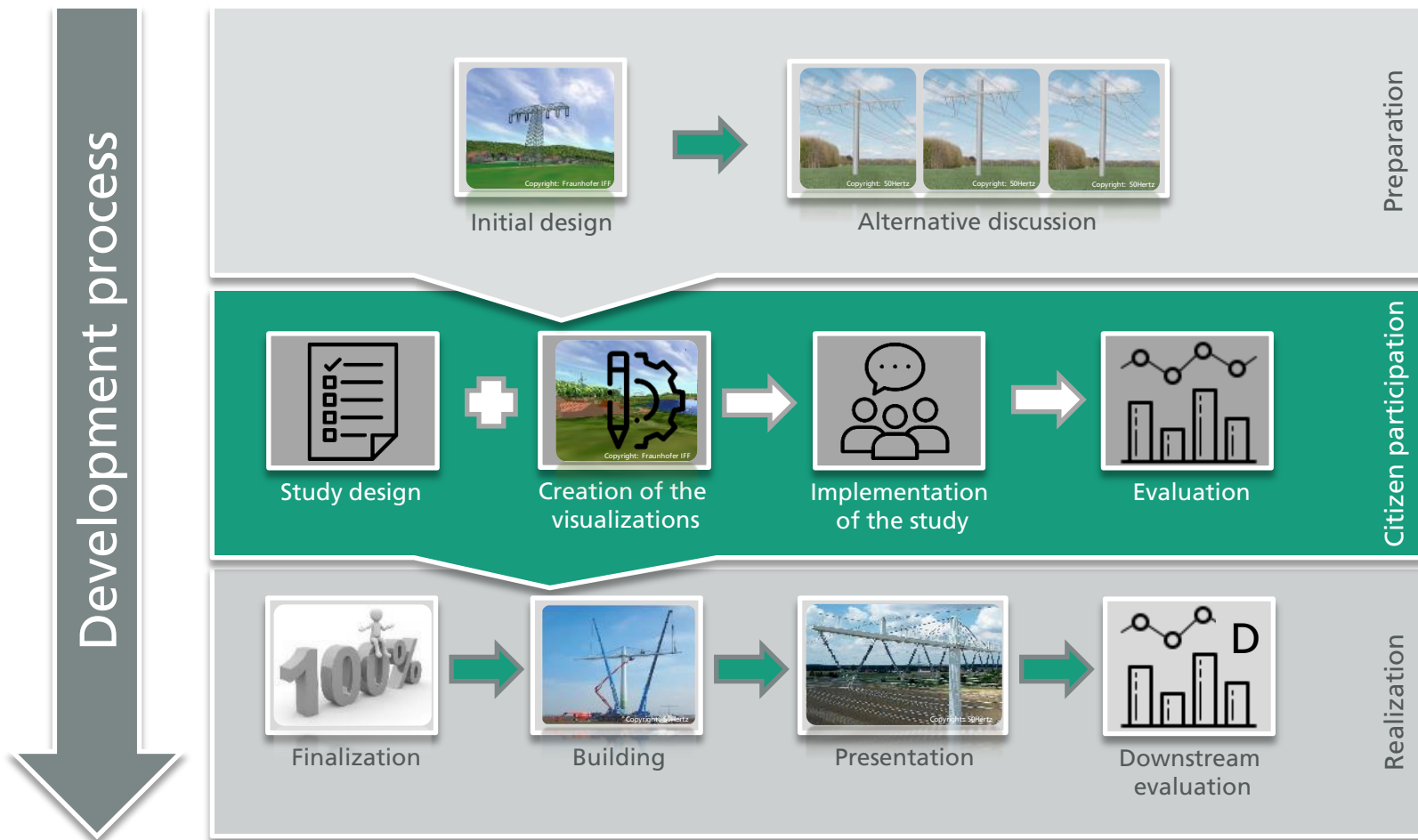
- Solution approach:
  - German transmission network operator 50Hertz: Development of a more compact transmission tower type with three different isolator variants
  - Integration of the population as part of an acceptance study
  - Interactive visualizations as a core element of citizen participation



→ Early transparent civil dialogue to minimize conflict potential

# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 2. Method

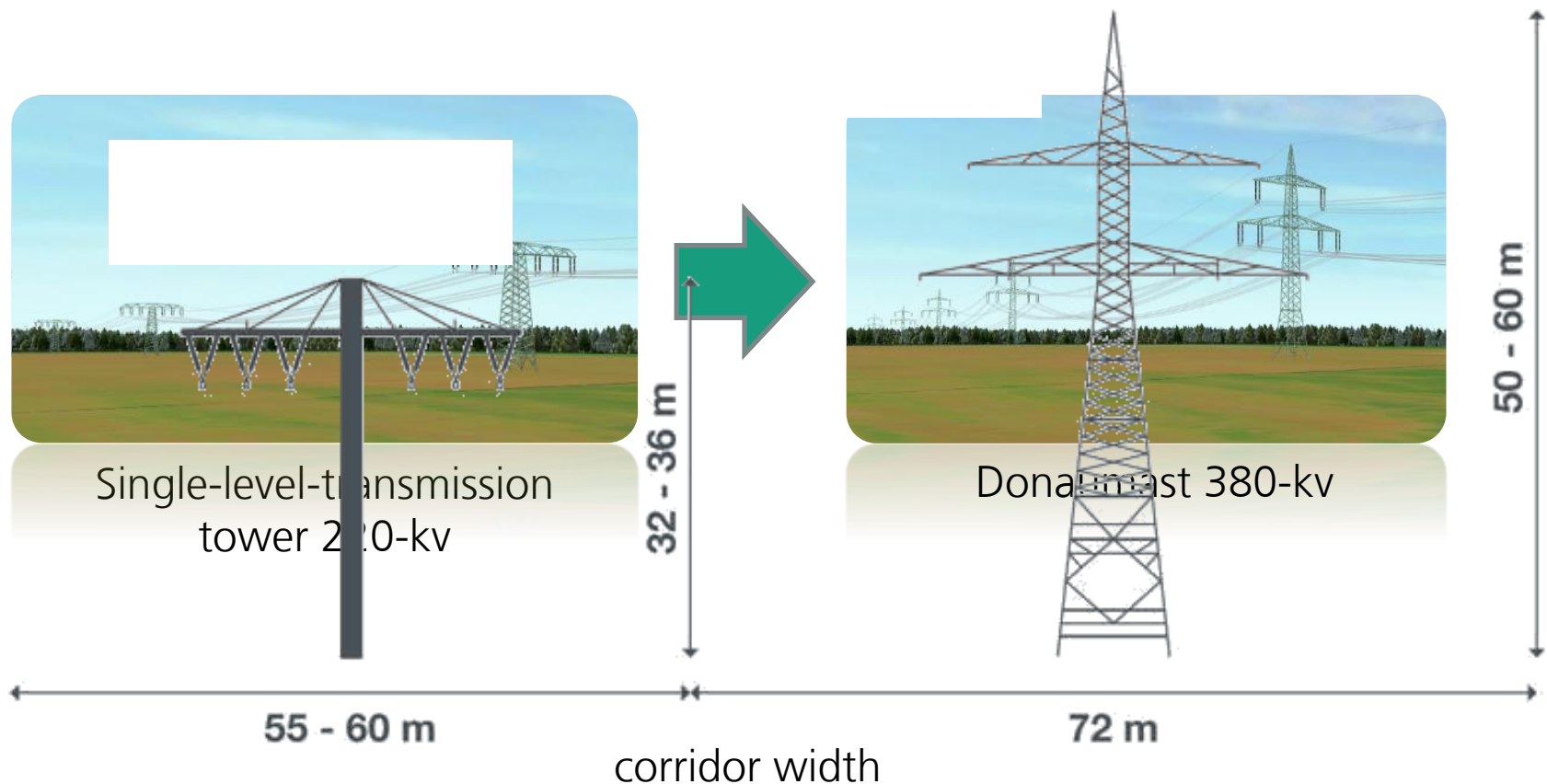


# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 1st step: Preparation – initial situation

compactLine 380-kv

Donaumast 380-kv

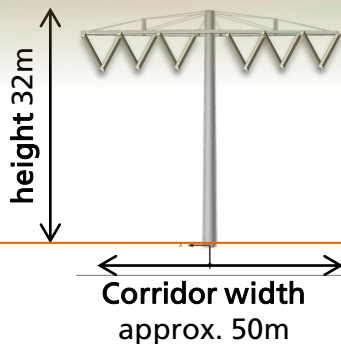




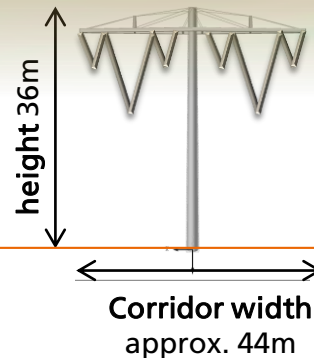
# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 1st step: Preparation – initial situation and discussion of variants

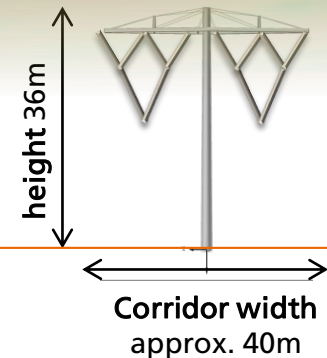
vVv-version



vVv-version



WV-version



# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 2nd step: citizen participation – study design



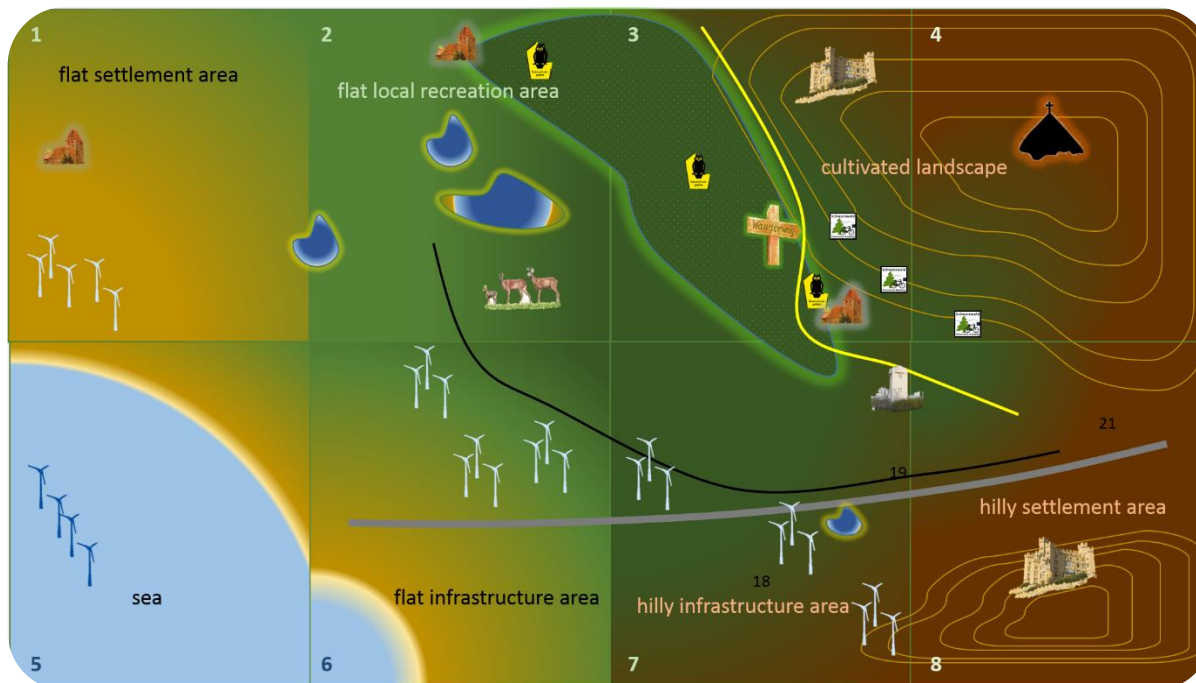
- Space visualizations as an integral part and the content of the questionnaire
- Use of space visualizations in the workshop implementation as a presentation component in the form of virtual tours
- Space visualization as a basis (screenshots) for the questionnaire creation by project partners
- On-site random selection
- Online questionnaire for representatives of politics / media / associations
- Space visualization in the form of screenshots are part of the survey



# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 2nd step: citizen participation – implementation of the study II

### 1. Visualization – imaginary space scenario



- Anonymized landscape transmission tower representation as a starting point for the study
- Composition of a imaginary area consisting of 20 real existing spatial situations

# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 2nd step: citizen participation – implementation of the study III

### 2. Visualization – real existing region – Jessen

- Selection because area was set as model region
- Virtualization of a 234 km<sup>2</sup> large area near Jessen in Saxony-Anhalt/Germany



Flat located recreation area  
mit plain, trees, animals



Flat settlement area with  
infrastructure

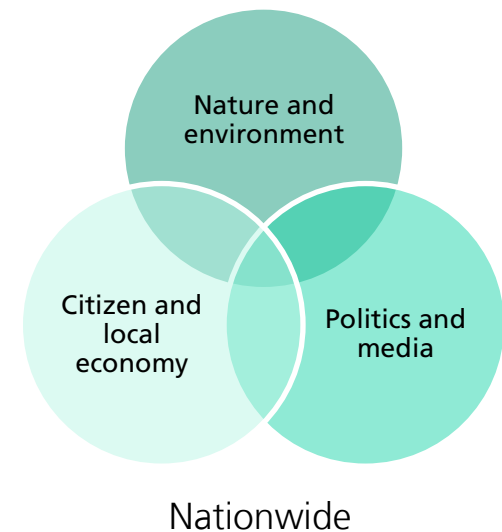


Garden

# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 2nd step: citizen participation – implementation of the study IV

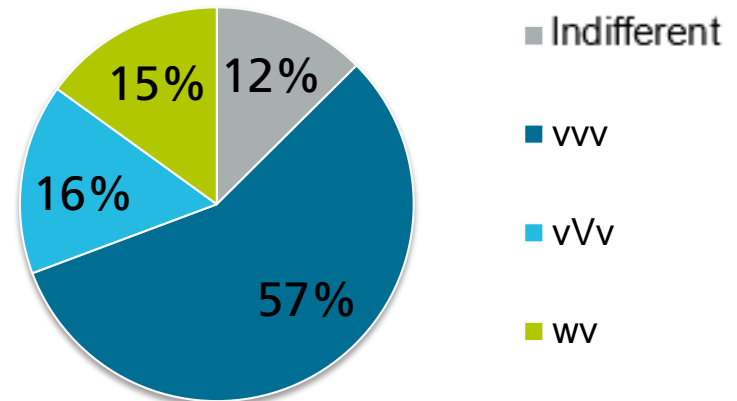
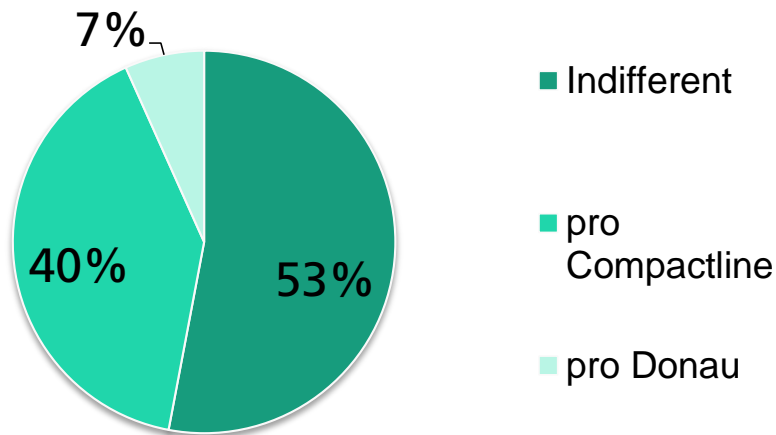
- 6 workshops with 10 to 15 participants
  - Implementation with three different expert groups in three geographical regions in the control area with representatives from all sectors
  - Nationwide in Berlin with representatives from environmental protection, media and politics
  - Workshops realization:
    - Introduction to the topic
    - Consideration of the tours in the individual regions
    - Discussion and possibility to interactively respond to direct requests from the participants
    - Fill out questionnaire
- Public survey with 794 participants in three regions
- Multiplier survey with 125 participants



# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 2nd step: citizen participation – evaluation and results I

- 50Hertz:
  - Acceptance: transmission tower design as acceptance factor
  - Design: compactLine is higher rated then Donaumast
  - Isolators: vv-variant is higher rated then vVv- and vv-variant



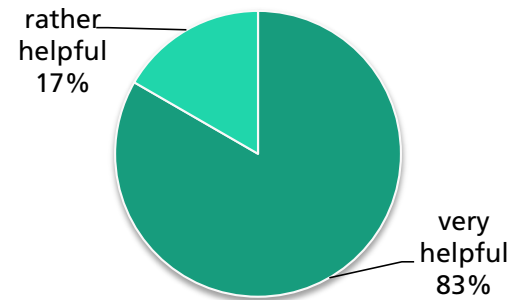
➤ Decision: realization of compactLine transmission tower with vv isolator variant

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# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 2nd step: citizen participation – evaluation and results II

- Citizens:
  - Positive opinion about 50Hertz because of citizen integration
  - Acceptance increases because of information and participation rights
- General:
  - Very positive rating of the visualization
  - Combination of visualization and workshop very successful
    - Combination of pictures and explanations



How helpful is the visualization in general to get an idea of overhead line projects?

➤ More personal level through direct integration of the interested parties

# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 3rd step: realization of the prototype

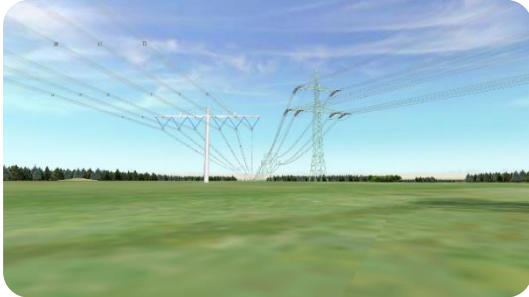


- Finalization:
  - Integration of the collected results in the final development process of the prototype
- Building:
  - Realization of the first test track with 5 compactLine transmission towers in Saxony-Anhalt / Germany
- Presentation:
  - Present the prototype to the public on the test site
- Downstream evaluation:
  - Evaluation of the results and public presentation



# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## Conclusion and further work



### Conclusion

- Involving the population in the development process of a compact transmission tower type
- Use of interactive visualizations as a central element of the acceptance study
- Approach to early involvement ensures a positive opinion about the project, the operator and the technology

### Further work

- Further development towards a holistic tool of acceptance analysis :
  - Integration of survey media
  - Direct reference to questions about the visual situation
  - Objective evaluation of visibility, gaze freedom and effective space
- Transfer to other infrastructure planning

# Thanks for your attention!

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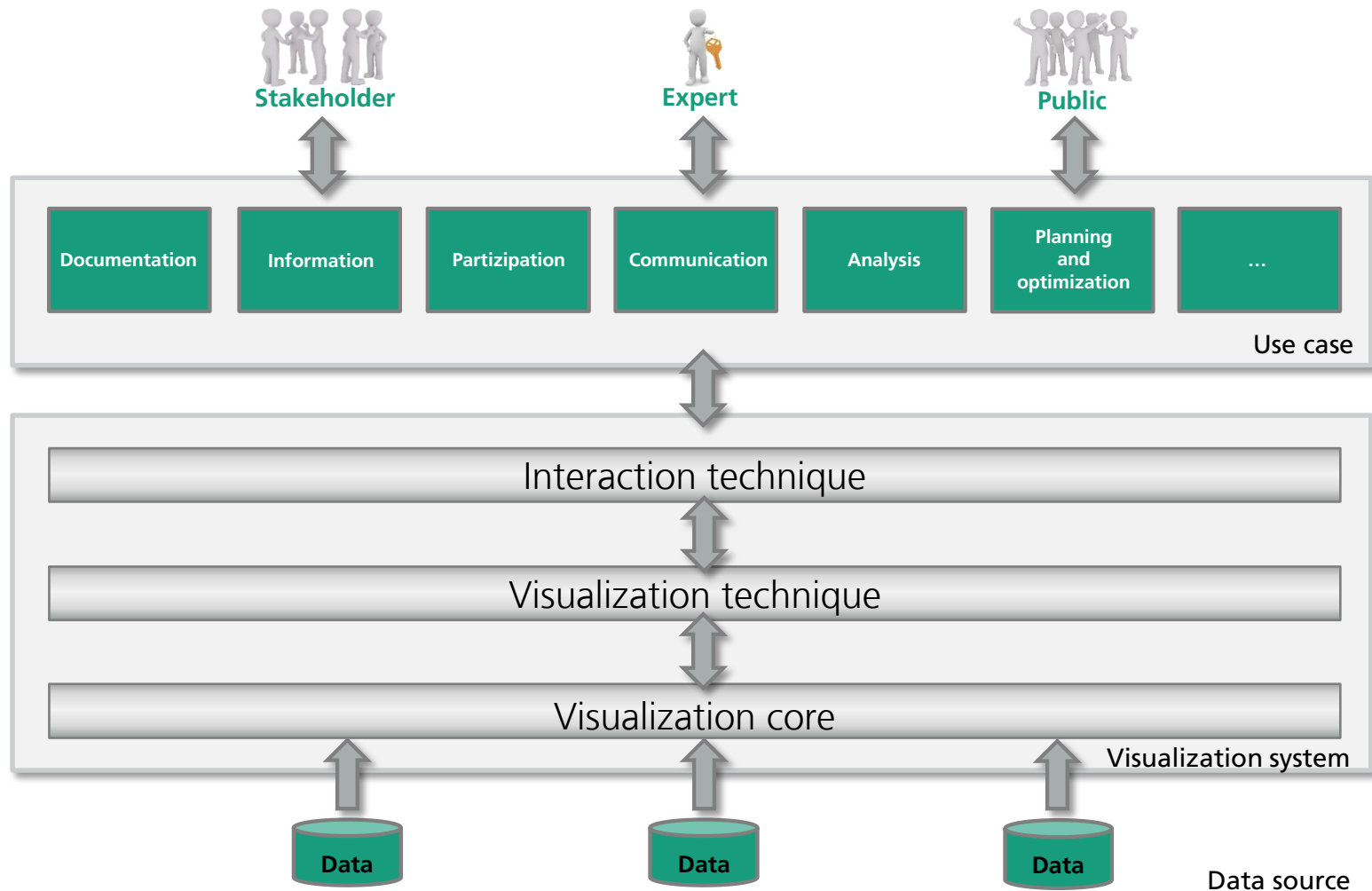
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# Interactive visualizations for the acceptance dialogue in the development process of compact power poles

## 2nd step: citizen participation – implementation of the study I



Data source

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