Concepts and practical examples of transdisciplinarity

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Three Major Global Transformations

- Globalization/Re-nationalization
- Digitalization/AI
- Sustainabilization/Climate Protection

Unintended Side Effects

- Global environmental changes (climate, biodiversity, pollution, environmental health)
- Increase of vulnerability with respect to the interactions between the technological, social and natural risks
- Urbanization, demographic changes, migration, land-use planning
- Governance deficits (corruption, re-nationalization, authoritative leaderships, neo-imperialism)
- Severe equity problems with respect to opportunities, income and vulnerabilities

Crucial Question:

What do these trends imply for the relationship between science and society?

Challenges

- Major increase in scientific studies and analyses without major impact on the success of sustainability, climate protection and resilient structural changes
- Plurality of knowledge claims: science is not the only knowledge provider that counts
- Missing bridges between knowledge and action
- Lack of convincing concepts for transformative and transdisciplinary research

Transdisciplinary Concept of Science

- *Classic Research* (curiosity driven, methodological rigor, open questions)
- *Goal Oriented Investigations* (coherent strategies to reach a predefined objective or set of objectives, including assessment of unintended consequences
- *Catalytic Expertise* (analyzing, designing and facilitating processes to initiate constructive and productive learning among and between different knowledge camps, interest groups and value orientations)

Four Functions of Scientific Evidence

- *Enlightenment* (informing policy makers about complex relationships)
- *Orientation* (providing assistance for foresight, vision and planning)
- *Instrumental and Strategic Planning* (predefined goals, strategy elicitation, strategy assessment, trade-off analysis and prioritization)
- *Co-creation* (developing new insights and orientation knowledge together with change agents)

Need for an Integrated Approach

- Policy makers need scientific support in all four substantive fields: enlightenment, orientation, strategy and co-creation.
- These different needs require special discourse formats (analytic and deliberative) that have their own normative rules and implementation criteria.
- Complex problems demand combinations of discourses: they may start as epistemic discourses, lead to orientation and strategy discourses and might end up as an exercise in co-creation.

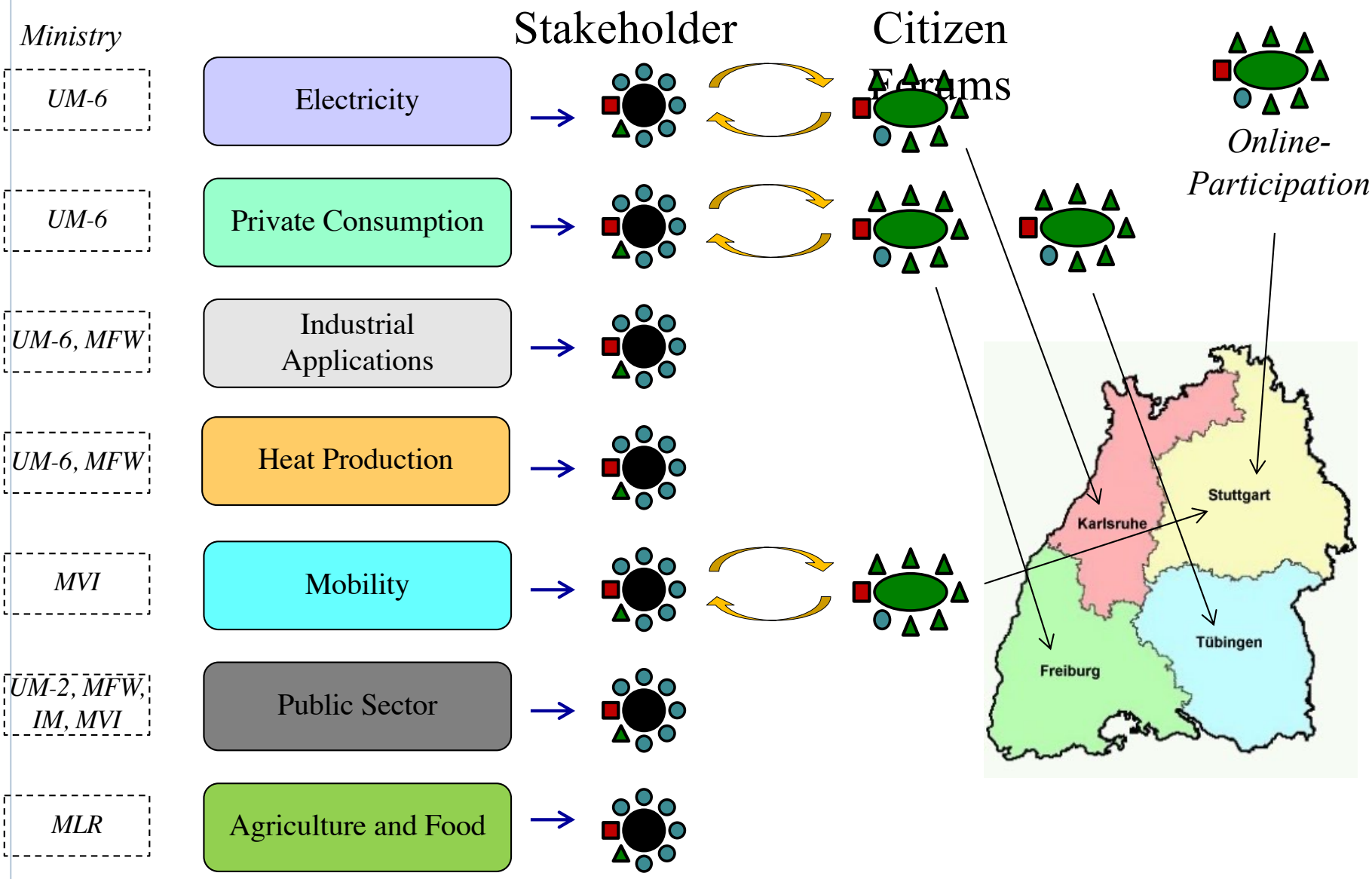
Case Study 1

Climate Protection Plan for the State of Baden-Württemberg 2015

Transdisciplinary Approach

- Climate Protection Goals defined by State Government (net-zero for 2050)
- Scientific experts were asked to provide roadmaps with strategies and measures to reach this goal
- Seven Round Tables were established for stakeholders to select, comment and prioritize measures
- Four citizen forums (random selection) were asked to select, comment and prioritize measures
- One virtual citizen forum (volunteers) was asked to select, comment and prioritize measures
- One joint forum was formed from all bodies to reach conclusive recommendations

The deliberative components of the Protection Plan



Results

- Overall 110 recommendations for climate protection
- Interaction between science (goal-oriented), stakeholders (Round Tables), randomly selected citizens, and virtual volunteers
- Integration board released: 46 consensual recommendation, 28 partly supported recommendations (advocated by some and tolerated by the others), 12 contested and 25 highly contested recommendations
- Validation by expert group with respect to effectiveness and efficiency
- State Government released protection plan honoring most of the recommendations

Case Study 2

The German National Citizen Assembly 2022

Division in analytic and deliberative component

- *Characteristics of analytic component*
  - Expert Assessment on the effects of different policies and measures
  - Establishment of a scientific committee to monitor the process and to provide analytic input
  - Establishment of a core groups of scientists to assist citizens in making evidence-based judgements
- *Characteristics of deliberative component*
  - Based on a random selection of 168 citizens of Germany (corrected for age, education and region)
  - Four major topics: mobility, heating system, consumption and food(nutrition
  - Due to Corona: online over a period of six weeks

Process of Deliberation

- *Plenary sessions*
  - Input by expert(s)
  - Question and Answers period
  - Small groups that were facilitated by professional moderators
  - Small groups without moderation
  - Results were reported to plenary and documented
- *Evaluation sessions*
  - Policies and measures were discussed with respect to advantages and disadvantages
  - Experts assessed the effectiveness of each suggested policy and measure
  - Small groups made suggestions for final discussion
  - In the end, vote of all citizens (threshold 75% approval)

Results of Deliberation

- *Preferences*
  - Clear decision (98%) to keep the Paris agreement
  - Phase-out of coal before 2035
  - Exchange of home heating/cooling system to accommodate green energy sources
  - More emphasis on public transportation and bicycle routes
- *Conflicts*
  - Additional costs should be taken up by tax-money
  - Rich people should pay more for the transformations
  - Preference for economic incentives, subsidies and governmental role models, but not prohibitions

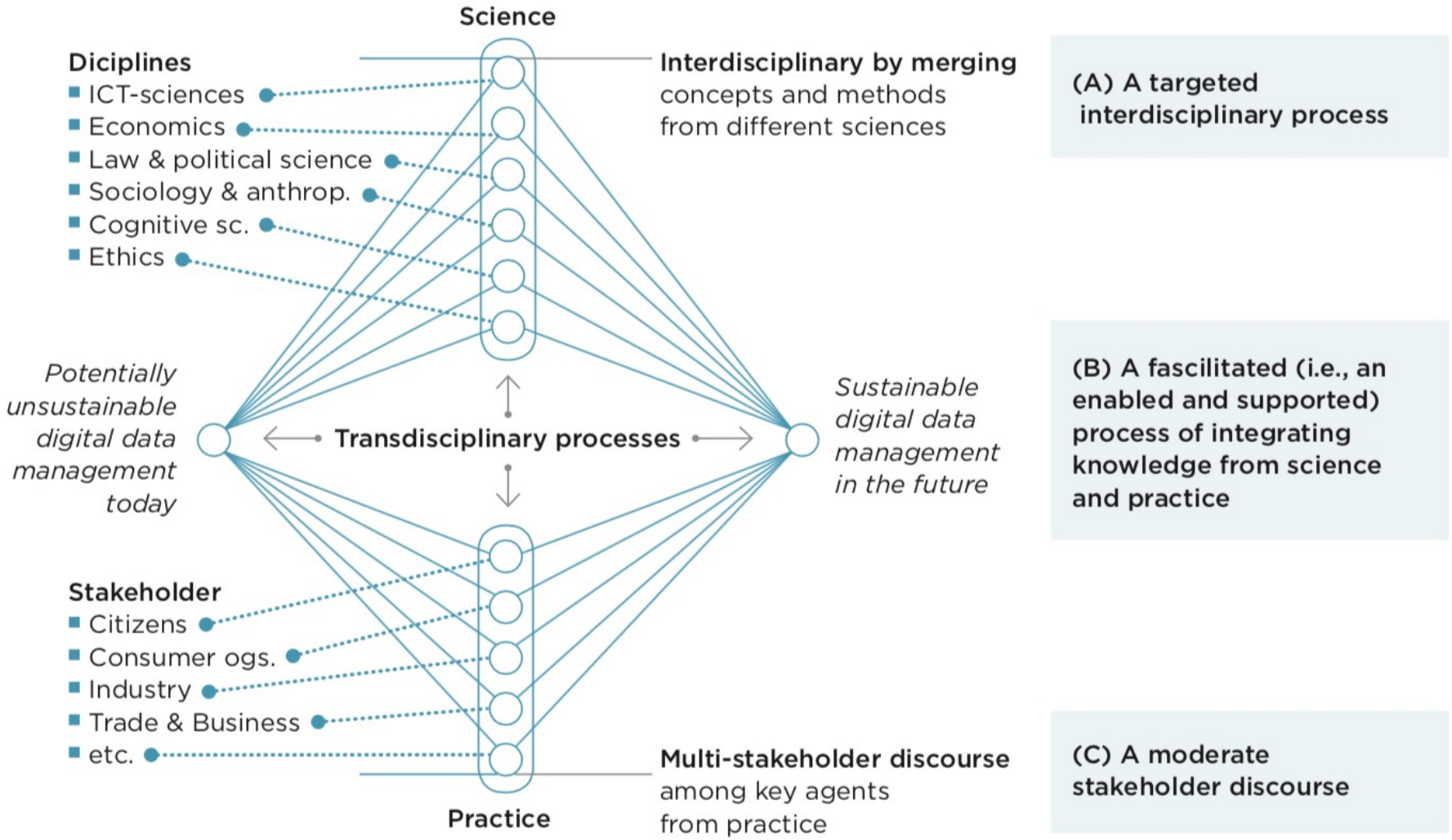
Implementation of Recommendations

- *Resonance*
  - Government and parliament felt supported
  - Most stakeholder groups endorsed the recommendations
  - But also skeptical views about acceptance in the broader population
  - Mixed media evaluation (positive and negative)
- *Impacts*
  - Strong emphasis on justice and fairness (but programs do not convince the skeptical public)
  - Law for exchanging heating systems failed due to public protest
  - Polarization with respect to green energy plans increased over the last two years

Case Study 3

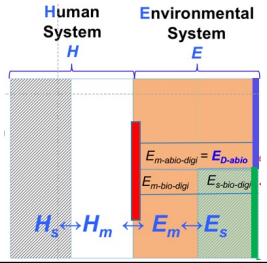
Responsible Pathways for Date Integrity and Protection (DiDaT)

The co-generation of knowledge by science and practice



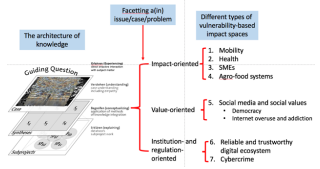
Process of Deliberation

Consider the human-digital world



Construct facets for identifying vulnerabilities

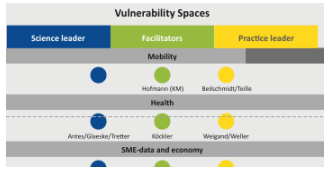
Three types of impact spaces



- **Identify vulnerabilities**
- **Describe mechanisms which cause them**
- **Classify them**
- **Describe interactions among them**

Build teams based on

- **Stakeholder Analysis**
- **Scientific discipline analysis**

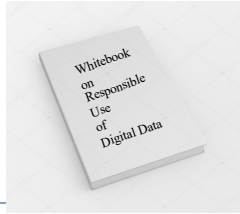


- **Create options that counter vulnerabilities**
- **Construct intervention scenarios**
- **Scenarios evaluation by multi-stakeholders**

- **Develop orientations on how mechanisms can be countered**
- **Produce White Book**

- **Launch a discursive consultation of the White Book**
- **Launch self-declarations**
- **Discuss interventions**

Develop recommendations and orientations for self-governance and regulation



Results: Identifying societal vulnerabilities, but no consensus or agreements on necessary actions

Expert Input

a) Strong conflicts among experts
b) Division between technical, social science and ethical experts
c) Multiple messages at the end, no consensus

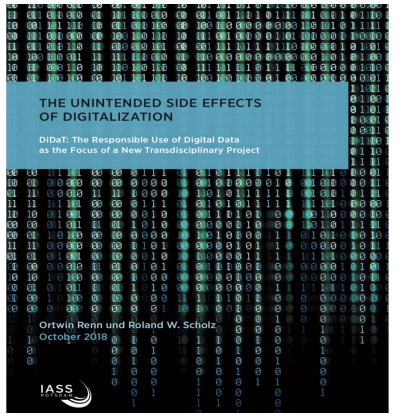
Stakeholder Input

a) Major conflicts about:
- ownership of data
- economic evaluation,
- access to data
- strength of regulation

b) Absence of key stakeholders

Outcome

a) List of vulnerabilities and requests for action
b) Consensus on general orientations, but not on measures



Conclusions

- New role for science:
  Focus on three major scientific concepts
  - Curiosity driven, classic concept
  - Goal oriented, strategic and instrumental concept
  - Process-oriented, catalytic concept
- Need for an integrated governance approach providing understanding, orientation, strategies and co-production of knowledge and action
- Three case studies show: in principle, the transdisciplinary design works, but it depends on topic, actors and political contexts