

The Role of Natural and Social Sciences for Transdisciplinary Research and Implementation in the Energy Transition



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Ortwin Renn

Research Institute for Sustainability
Helmholtz Center, Potsdam

Four Major Global Transformations (intended)

- Continuous Economic Growth (De-growth)
- Globalization/Re-nationalization
- Digitalization/AI
- Sustainabilization/Climate Protection
 - Energy transition
 - Agriculture and Food
 - Housing and consumption

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 energy transition
- 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)

Social Science Instruments and Methods I

■ ***Classic research***

- Observation (participatory and non-participatory)
- Experiments (Quasi-experiential)
- Surveys (quantitative and qualitative)
- Case Studies

■ ***Goal oriented research***

- Simulation (Game theory)
- Scenario Construction
- Foresight
- Gaming
- Delphi methods (traditional and Group Delphi)

Social Science Instruments and Methods II

■ *Catalytic Research*

■ *Diagnostics*

- Conflict analysis
- Network analysis
- Discourse analysis

■ *Solution-Oriented (participatory)*

- Multi-attribute utility method (rational actor model)
- Communicative action model (Habermas)
- Models of deliberative co-creation (Dryzek; Barber)
- Search for mutually agreed arrangements (postmodern)
- Combination: analytic-deliberative discourse (US Academy)

Analytic-Deliberative Approach

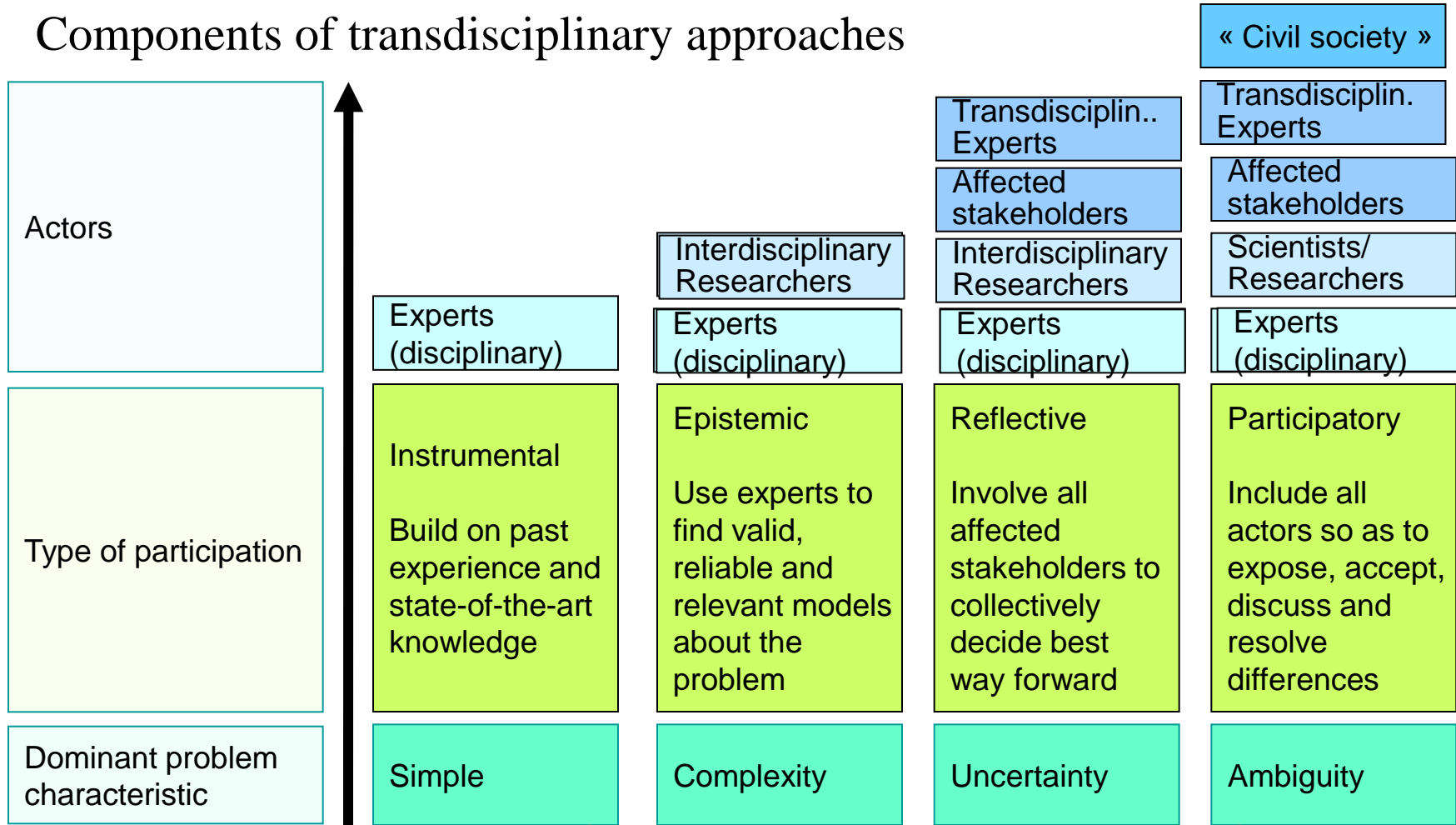
■ *Characteristics of analytic component*

- Legitimate plurality of evidence
- Need for joint fact finding
- Multi-criteria assessment of benefits and risks
- Transparency about inevitable trade-offs

■ *Characteristics of deliberative component*

- Based on arguments not on positions or interests
- Common Good Orientation: effectiveness, efficiency, sustainability, fairness, resilience and economic viability
- Crucial factor: inclusiveness and consensus on rules for how to make decisions

Components of transdisciplinary approaches



As the level of knowledge changes, so will the type of participation need to change

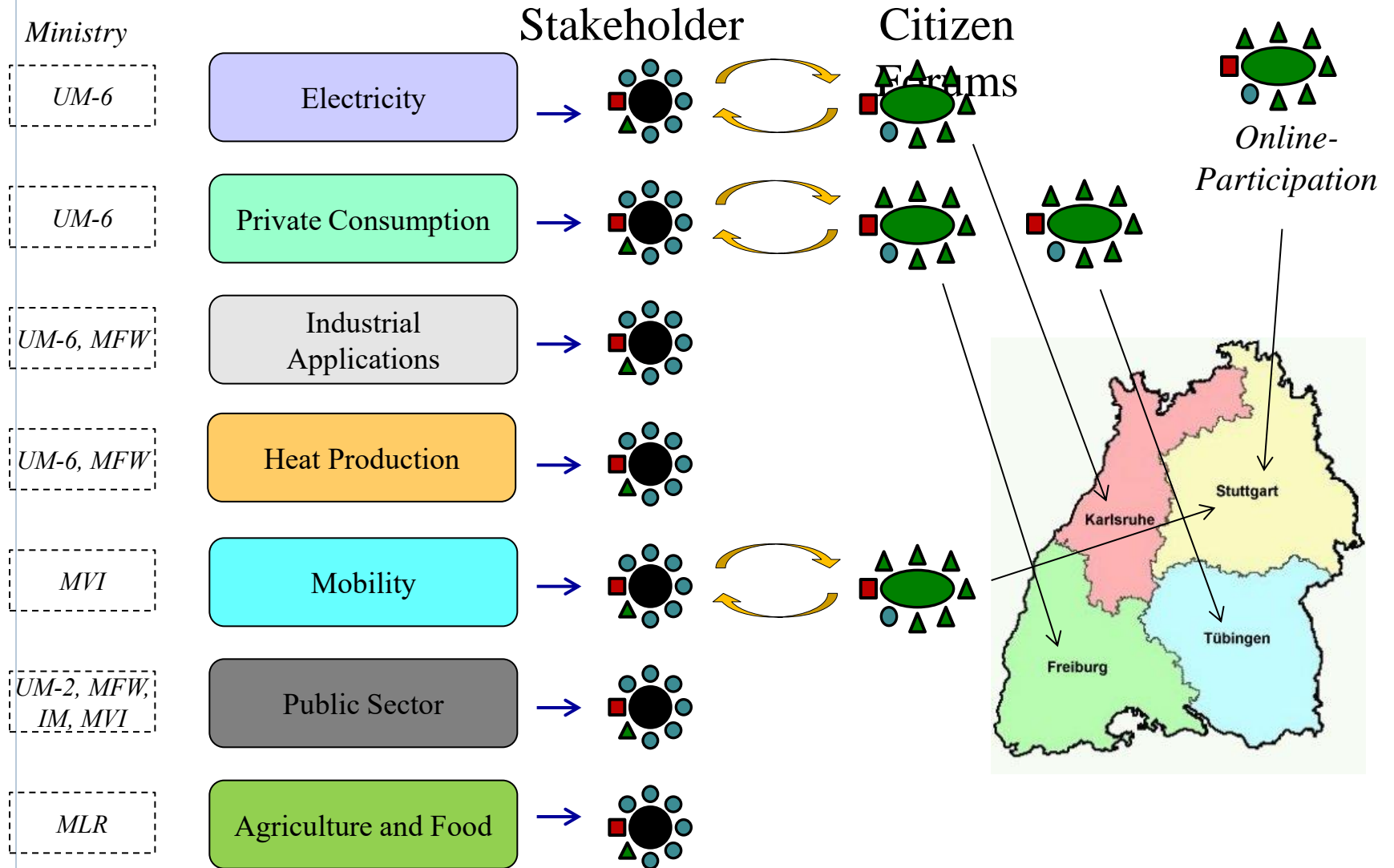
Case Study 1

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 Climate 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 including 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 many 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

EU Real-Deal Project

1st Main Question

How can we overcome and resolve the potential conflict between respecting the planetary boundaries for reaching a sustainable future and preserving openness and democratic sovereignty in our governance institutions and processes?

a) **Potential solution:** analytic-deliberative discourse (US Academies 2008)

- input by scientists
- Deliberative balancing of options by democratic bodies and/or participatory formats

b) **Operationalization in REAL DEAL:**

- Delphi-Workshops with experts and stakeholders
- Round Tables with organized stakeholders with input from Group-Delphi
- Combination of Group Delphi with Citizen Assemblies

2nd Main Question

How can we assure that representatives of **marginalized or disadvantaged groups** of society are an integral part of participatory processes and how can a fair and adequate integration of different and sometimes conflicting positions be accomplished?

- a) **Potential solution:** combination of focus groups and citizen assemblies
 - First component: citizen assemblies
 - Second component: Focus groups with marginalized groups
 - Integration: Feeding of focus group results into the citizen assemblies

- b) **Operationalization in REAL DEAL:**
 - Focus groups with selected marginalized groups
 - Feeding the results of focus groups into the citizen assemblies

3rd Main Question

What is the appropriate vertical governance level (community, region, province, country, EU, UN) for what kind of policy issues and measure and how can outcomes of different vertical governance levels be integrated for a common EU policy process?

Potential solution: vertical integration of participatory formats

- Organization of participatory formats on each vertical governance level
- Integration:
- Organization of integration boards





Operationalization in REAL DEAL:

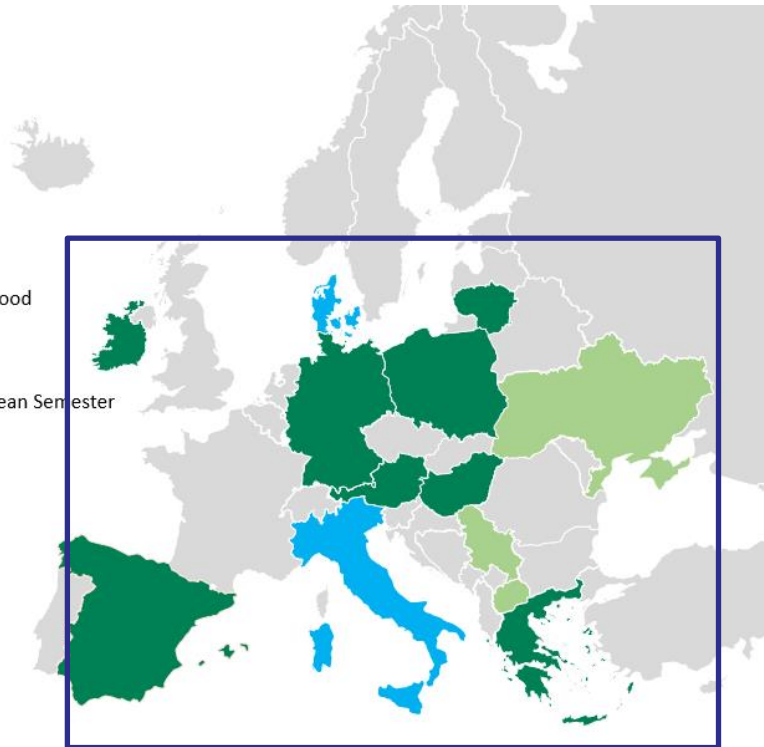
- Not empirically tested
- Integration of different participatory formats have been partly simulated in a European Group Delphi and the European Semester Program

REAL DEAL Pilots

REAL DEAL tested different formats in **11 countries, 2 on the EU semester process and 3 at EU level**

REAL DEAL countries:

-  EU MSs
-  Neighbourhood
-  EU MS / Topic European Semester
-  EU level



REAL DEAL Formats and Test Results

Combination of Delphi and Citizen Assemblies (Hybrid)

- *Goal:* Specifically targeted to test the interaction between scientists, stakeholders and members of the general public
- *Countries:* Germany, Greece, Hungary, and North Macedonia
- *Topics:* Energy, Food, Financing
- *Products:* Experts provide state-of-the-art knowledge and range of legitimate judgments

- *Results*
 - Delphi: consent on dissent(s): exclusion of illusions, absurd claims and misperceptions (true range of knowledge camps)
 - Citizen Assembly: positive appreciation of Delphi results, little resistance, but the results need translation into convincing narratives and visual images
 - Delphi results improved understanding of citizens and had a positive effect on motivation to act

Conclusions

- Focus on three major scientific concepts
 - Curiosity driven, classic concept
 - Goal oriented, strategic and instrumental concept
 - Process-oriented, catalytic concept
- Transdisciplinary approach includes methods and instruments from all three concepts; classic, strategic and catalytic
- The most challenging part is the catalytic process:
 - Combination of expertise, interests and values
 - Design of formats for a successful integration
 - Convincing answers to inclusion, closure and transfer
- The empirical case studies show that analytic-deliberative processes have the potential to improve understanding of complex relationships and enhance motivation to act

Final Note

Deliberative processes for involving stakeholders and the general public are instruments of art and science: They require a solid theoretical knowledge, a personal propensity to engage in group interactions, and lots of practical experience

Many thanks

Contact: orenn1951@gmail.com

Extra Slides for Discussion

Getting your research into Parliament

Why is it important?

PROVIDES EVIDENCE TO INFORM POLICY MAKING



USED TO SCRUTINIZE LAWS AND POLICIES



CITIZENS CARE ABOUT EVIDENCE

DEMONSTRATES RESEARCH IMPACT



The routes in:



SELECT COMMITTEES



PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY (POST)



LIBRARIES

CORRESPONDENCE WITH MEMBERS



ALL-PARTY PARLIAMENTARY GROUPS



NGOs



THINK TANKS



EVENTS

TOP 10 TIPS:

Making Connections



Taylor & Francis Group
an informa business

SENSE
about SCIENCE

HOUSES OF PARLIAMENT
PARLIAMENTARY OFFICE OF SCIENCE & TECHNOLOGY

Distinction:

- Disciplinary
- Multi-disciplinary
- Inter-disciplinary
- Trans-disciplinary

Multi-disciplinarity combines different disciplines in an additive way, Inter-disciplinarity provides a cooperative approach to developing a joint research design

A transdisciplinary approach integrates (a) theory and practice (b) includes different types of knowledge and (c) provides targeted information to users

Features of Transdisciplinary Sciences I

- Integration of theory and practical application
 - Scientific and systematic analysis
 - Solution-oriented practicable orientation
 - Prepared for implementation

- Integration of different types of knowledge
 - Academic, systematic insights
 - Experiential knowledge (learned by actions)
 - Tacit knowledge (indigenous, local)
 - Intuition

Features of Transdisciplinary Sciences II

■ *Participatory Research Design*

- Experts and knowledgeable persons
- Politicians and administrators
- Stakeholder (corporations, economy, civil society)
- Ordinary citizens (random selection)

■ *Design for multi-actor dissemination*

- Based on needs and interests of participating actors
- Framed in a language that is well understood by each actor
- Linked to direct implementation

Two questions for co-production of knowledge

■ ***Inclusion***

- *Who*: stakeholders, scientists, public(s)
- *What*: options, policies, scenarios, frames, preferences
- *Scope*: multi-level governance (vertical and horizontal)
- *Scale*: space, time period, future generations

■ ***Closure***

- *What counts*: acceptable evidence
- *What is more convincing*: competition of arguments
- *What option is selected*: decision making rule (consensus, compromise, voting)

Who should be involved?

■ **Vertical governance**

- *Political bodies ranging from communities via regions, states, countries, to international level*
- *Other agencies or ministries*
- *Subordinate administrations*

■ **Horizontal governance**

- *Stakeholders (organized groups with an interest in the issue including private sector and NGOs)*
- *Experts (groups with specific knowledge)*
- *Multipliers (Media, opinion leaders)*
- *Affected and general public*

Candidates for Participatory Models

■ ***Organized stakeholders***

- Hearing
- Round Tables (Forum, Dialogue Processes)
- Negotiated Rulemaking
- Mediation and Alternate Conflict Resolution

■ ***General public***

- Ombudsperson
- Public Hearings
- Citizen Advisory Committees
- Citizen Forum, Planning Cells, Citizen Juries
- Consensus Conferences (Danish Model)