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Deutsches Institut für  
Entwicklungspolitik



German Development  
Institute



# Modes & Logics of Inter- & Transdisciplinarity

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# UN Sustainable Development Agenda



## Call for Science & science-based ,Solutions‘

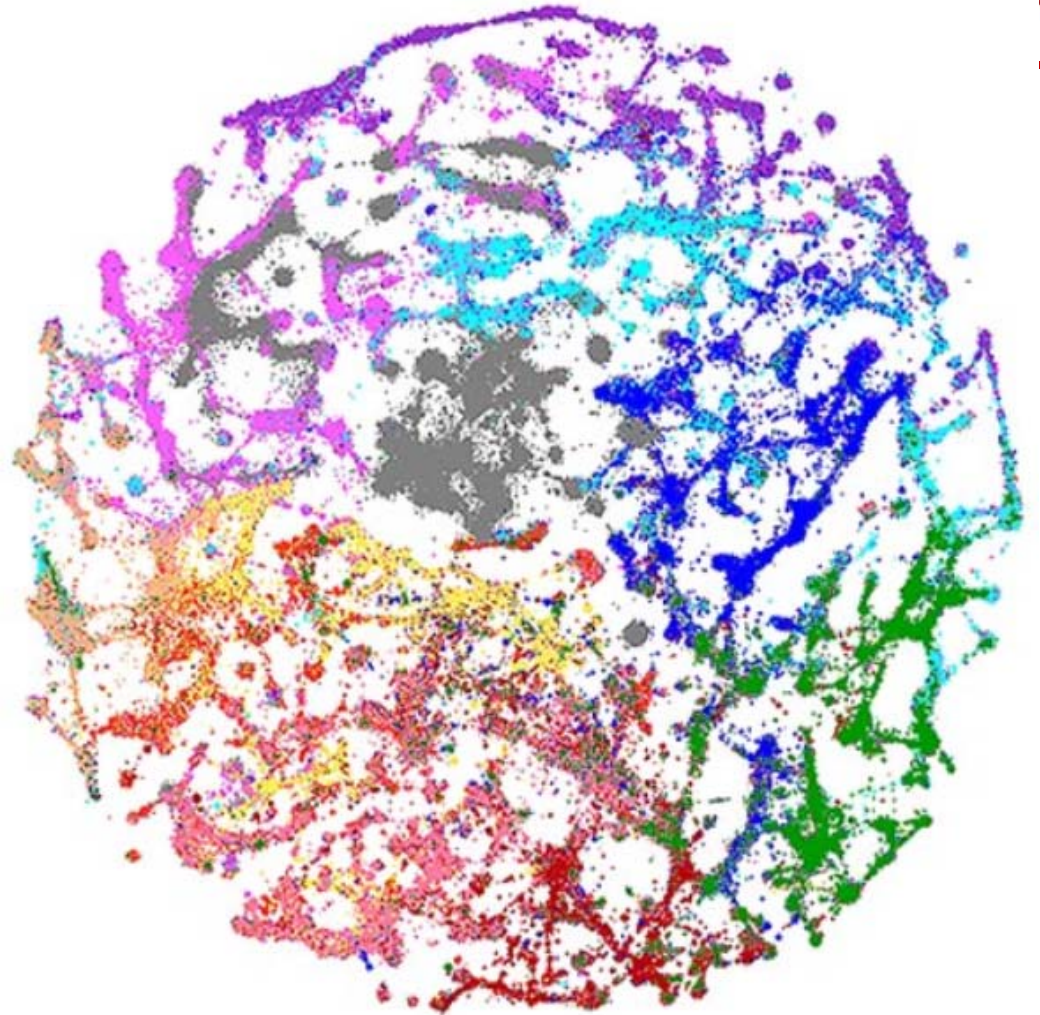
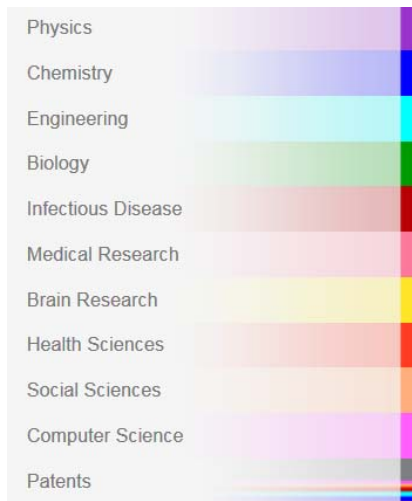


§13 (f) Dedicate greater resources to **marine scientific research, such as interdisciplinary research and sustained ocean and coastal observation**, as well as the collection and sharing of data and knowledge, including traditional knowledge, in order to increase our knowledge of the ocean, to better understand the relationship between climate and the health and productivity of the ocean, to strengthen the **development of coordinated early warning systems on extreme weather events and phenomena**, and to **promote decision-making based on the best available science, to encourage scientific and technological innovation**, as well as to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries;

# World of Science



„The world has problems, the universities have departments.“ (Brewer, 1999)



1996-2011: 20 mio. scientific articles; 2 mio. patents

[www.mapofscience.com](http://www.mapofscience.com)



# Challenges of Inter- & Transdisciplinarity

## ‘Language’

- Different *‘languages’* within and between disciplines and the world.

## ‘Paradigms’

- Different *cultures* and *frames of reference*.
- Different *methods, theoretical* and *operational objectives*.

## ‘Organisation and Incentives’

- *Institutional impediments* related to incentives, funding, and priorities given disciplinary, inter- & transdisciplinary work
- *Professional impediments* related to hiring, promotion, status, and recognition.

Brewer, 1999 & Hornidge et al. 2011



# What Type of Science?

## Ontology:

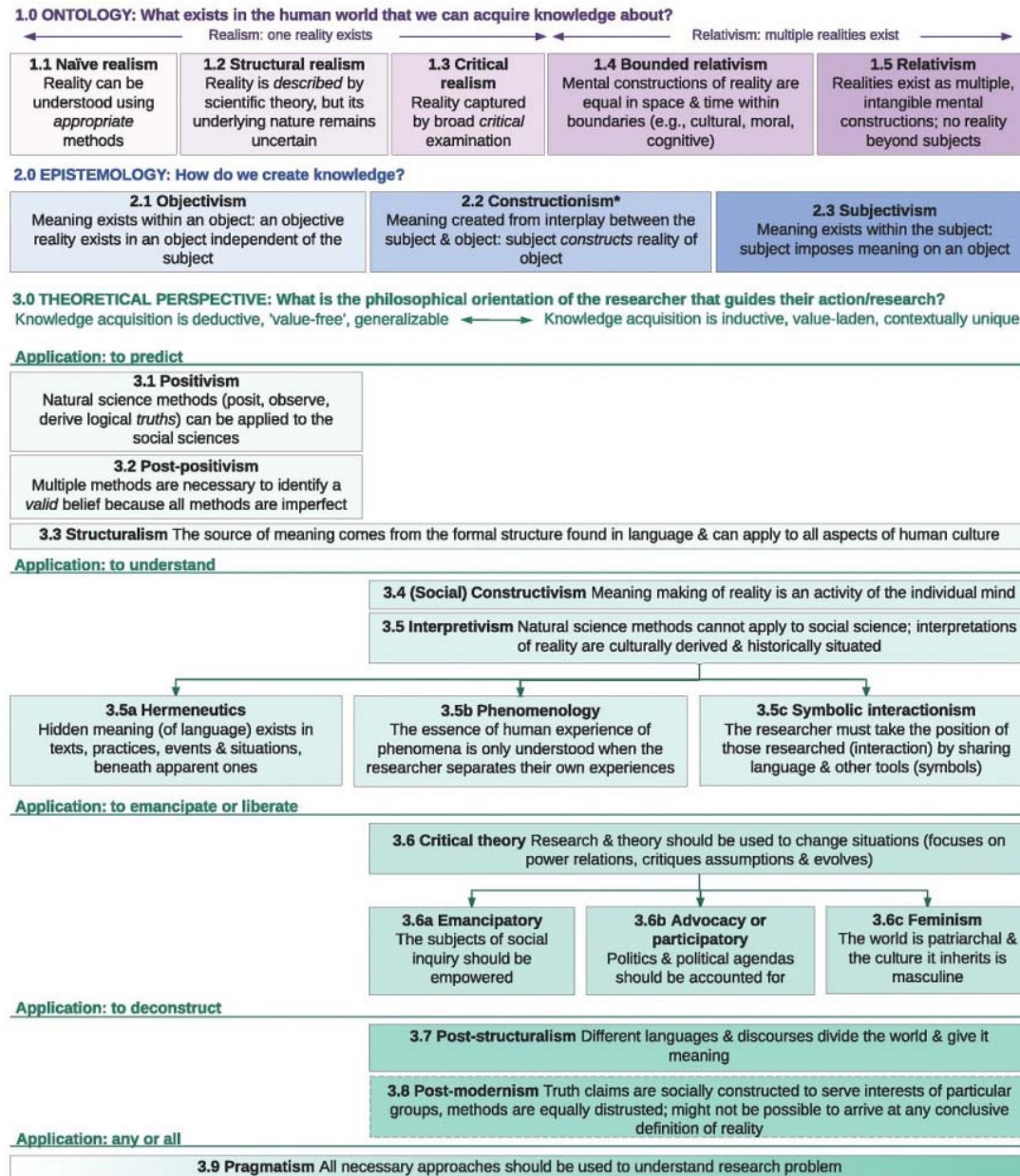
### What exists?

## Epistemology:

### How do we know?

## Motivation:

### Why do we research?



Moon/Blackmann 2014

# Epistemologies in Sustainability Research – simplified!



## Objectivism vs. Constructivism

### Objectivism

Meaning exists within an object:  
an objective reality exists in an  
object independent of the subject

### Constructivism

Meaning created from interplay  
between the subject & object:  
subject *constructs* reality of object

## Effects on how we study ,reality‘:

Mapping and analysing ,*reality as a given*‘ versus mapping ,*reality as being constructed*‘

# Objectivism

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the conviction that reality is mind-independent; reality as an *absolute*;



## What does this mean for empirical (social/natural science) research?

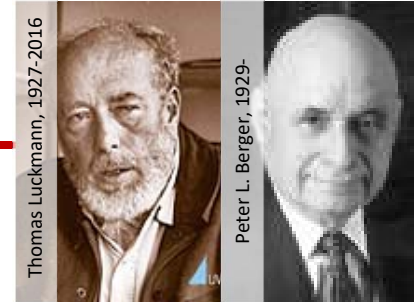
- Reveal categories & types found in nature >> to understand natural/social processes as factually given
- Which ecosystem dynamics can be observed that give us an idea of the systems future ahead?
- Which functions do different ‚actors‘ in an ecosystem fulfill and how can changes be causally explained?
- What would you add here?

➤ “My philosophy, in essence, is the concept of man as a heroic being, with his own happiness as the moral purpose of his life, with productive achievement as his noblest activity, and reason as his only absolute.” (Ayn Rand)

# Constructivism



Circular relationship of our self, communication (language) & social structures & practices (society)



## What does this mean for empirical (social/natural science) research?

- Reveal categories & types used by actors and structure discourses & behaviors >> to understand power structures
- Which categories & types do our interviewees use to explain their reality?
- Which institutions, roles and behaviors do they attach to these types?
- What would you add here?

*“It is the aim to (re)construct, based on which sensual relationships human act the way they act. The question is, how subjects, born into a historically and socially interpreted world, continuously (re)interpret and therewith change this world” (Reichert/Schröder, 1994: 59).*





# Interdisciplinarity

## Logics of Interdisciplinarity:

1. Problem-solving
2. Accountability & Innovation
3. Transformational shifts of knowledge practices

} Why ?

## Modes of Interdisciplinarity:

1. Integrative-synthesis
2. Subordination-service
3. Agonistic-antagonistic

} How ?

Barry, et al. 2008.

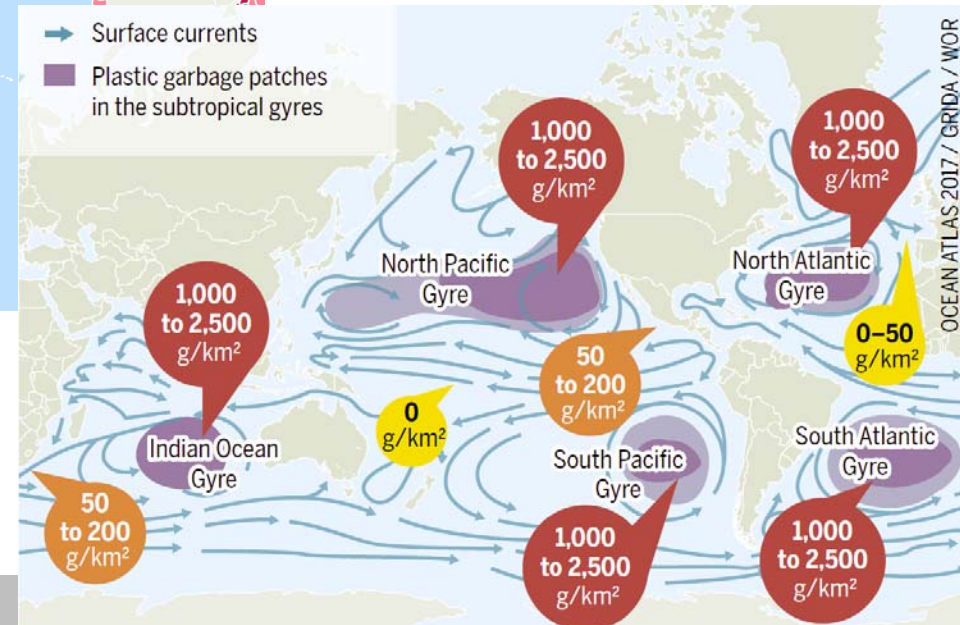


# Interdisciplinarity for Problem-solving

## Ocean in a dire State



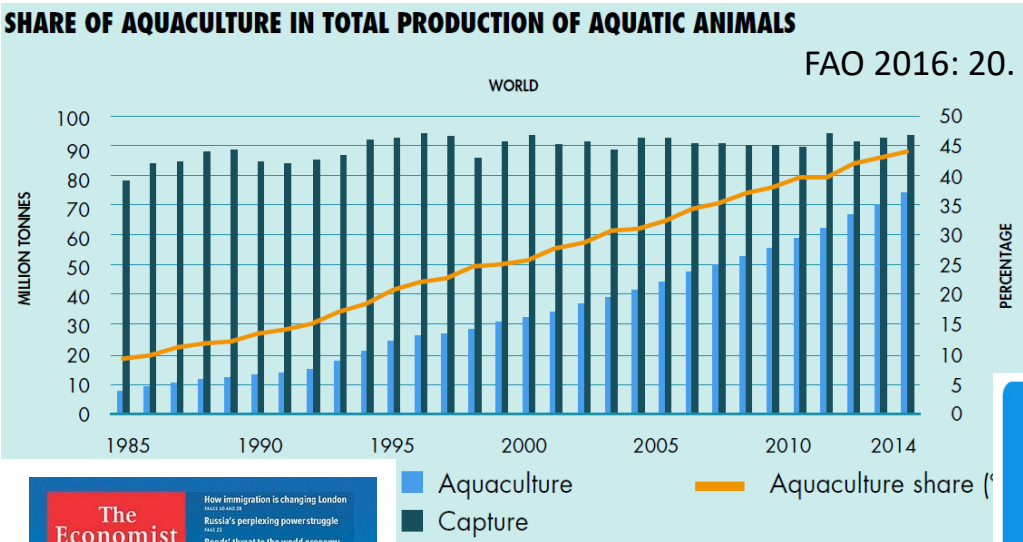
Ocean Atlas, 2017.



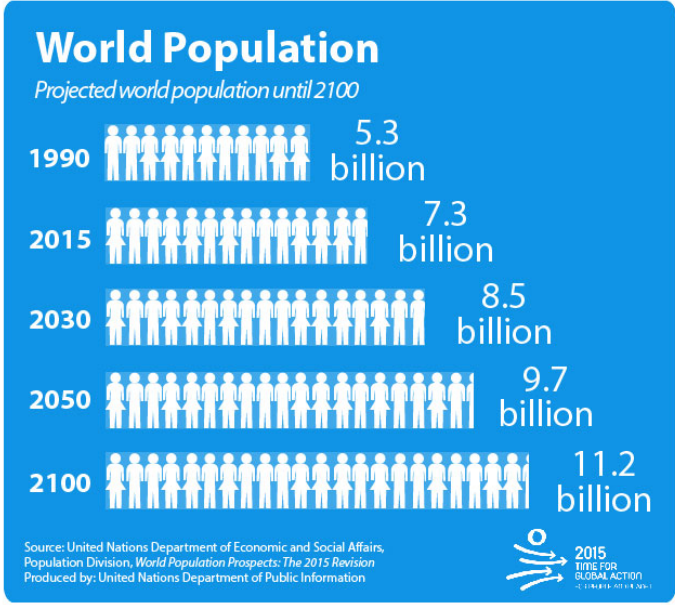


# Interdisciplinarity for Accountability & Innovation

## Blue Revolution for more 'Growth'



**Aquaculture 2014:**  
44, 1% total fish production (incl. non-food)



# Inter-/Transdisciplinarity for Transformed K-Practices



## Local empowerment through joint learning

Self-determined, self-driven envisioning of a future & development of innovations and transformative pathways towards these



### Putting coastal communities back in charge

**Target Outcome:** 1 million people (500,000 people in the Pacific and 500,000 in Eastern Africa) have strengthened livelihoods through improved design and implementation of community-based resource management.

Coastal communities, particularly across the Pacific islands, are becoming increasingly affected as essential marine resources that support hundreds of thousands of people are diminished by impacts such as climate change and overfishing.

WorldFish promotes community-based resource management, which helps coastal communities safeguard the future of their resources, including coral, mangroves and fish. Our research links localized fisheries management innovations to broader-scale governance improvements through policy analysis and institutional strengthening.

Projects in Solomon Islands, for example, have worked to halt the degradation of inshore reefs and fisheries by stabilizing and starting to rebuild them—so as to protect local food security and livelihoods in coastal communities.

Target SDGs:





# Interdisciplinarity

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Barry, et al. 2008.



# Interdisciplinarity

## Modes of Interdisciplinarity:

### 1. Integrative-synthesis

*„the integration of two or more antecedent disciplines’ in relatively symmetrical form” (28)*

### 2. Subordination-service

*„In this mode the service discipline(s) is commonly understood to be making up for or filling in for an absence or lack in the other, (master) discipline(s).“*

### 3. Agonistic-antagonistic

*„Interdisciplinary research is conceived neither as a synthesis nor in terms of a disciplinary division of labour, but as driven by an agonistic or antagonistic relation to existing forms of disciplinary knowledge and practice.” (29)*

Barry, et al. 2008.

# Ocean Governance for Sustainability



**Logic:** Accountability & Innovation

**Mode:** Integrative-synthesis

## European Network of Science, Policy & Practice

### Research Needs:

- Contested Ownership of Ocean
- Fragmented Regulatory Frameworks
- Need for Sustainable Management Tools

### & Policy Dialogue:



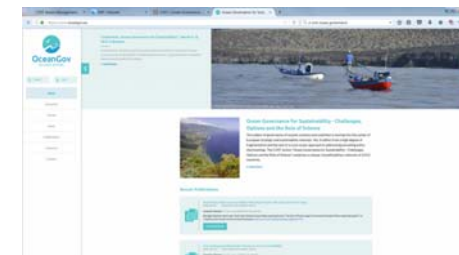
### Research Areas:

- Land-Sea Interaction
- Area-based Management
- Seabed Resources
- Nutrition Security
- Ocean Climate & Acidification
- Fisheries Governance

### Contributors:

- 224 Members
- 143 Institutions
- 29 Europ.Countries

### Newsletter



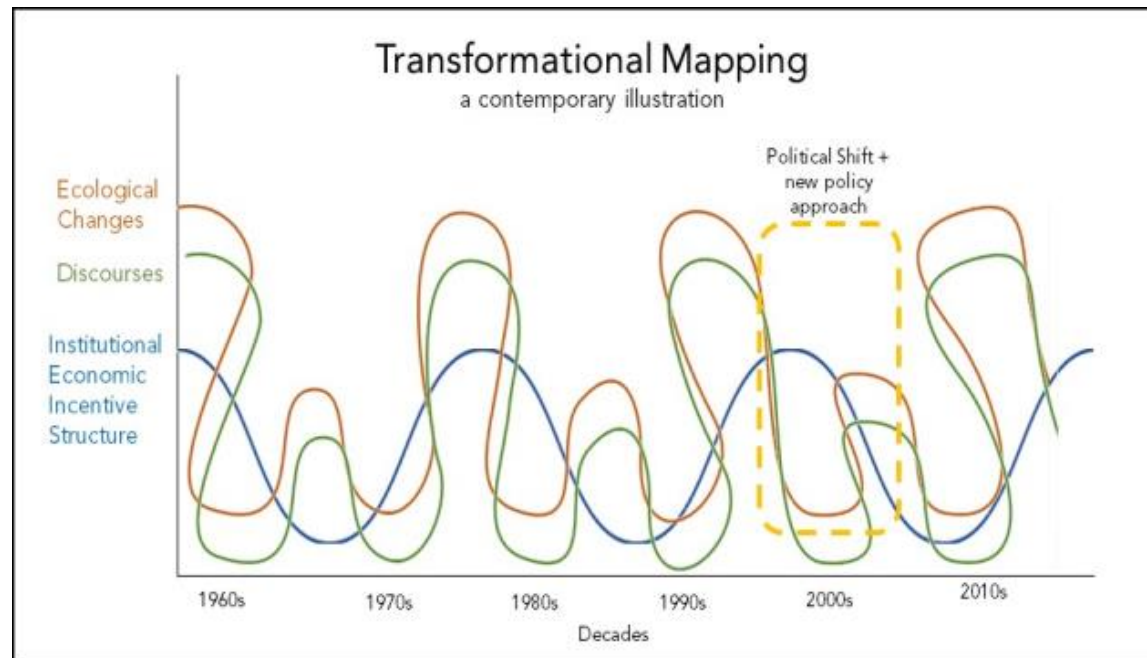
[www.oceangov.eu](http://www.oceangov.eu)

# The Meaning of Mangroves, Ecuador



**Logic:** Transformational shifts of knowledge practices

**Mode:** Agonistic-Antagonistic or Subordination Service?



Dynamic relationship (or interdependence ?) of mangrove ecosystems, discourses and institutional incentive mechanisms over time





# Agricultural Innovation Research, Uzbekistan

**Logic:** Problem-solving, Accountability & Innovation

**Mode:** Agonistic-Antagonistic

**Boundary Concepts:** 'Innovation', 'Stakeholder', 'Sustainable', 'Inter-', 'Transdisciplinarity'

**Boundary Objects:** institutional & technological Innovations

## Boundary Settings:

Interdisciplinary & International Project Team

High-Tech Strategy Germany & Sustainable Development  
Mandate

Uzbek Agricultural State Plan



Institutional Strengthening of a  
Water User Association



Reforestation of marginal Lands



Conservation Agriculture



Rapid Salinity Assessment

# Land & Water Management, Uzbekistan

**Project duration:** 2001 - 2011  
**Donor, budget:** BMBF, ca. 8.6 Mio Euro

## Project objectives:

- Developing **recommendations and simulation tools** for improved agricultural policies
- Providing **concepts for institutional restructuring** for a more sustainable natural resource use
- Developing **land and water management related innovations** for improved productivity and sustainability of agricultural systems





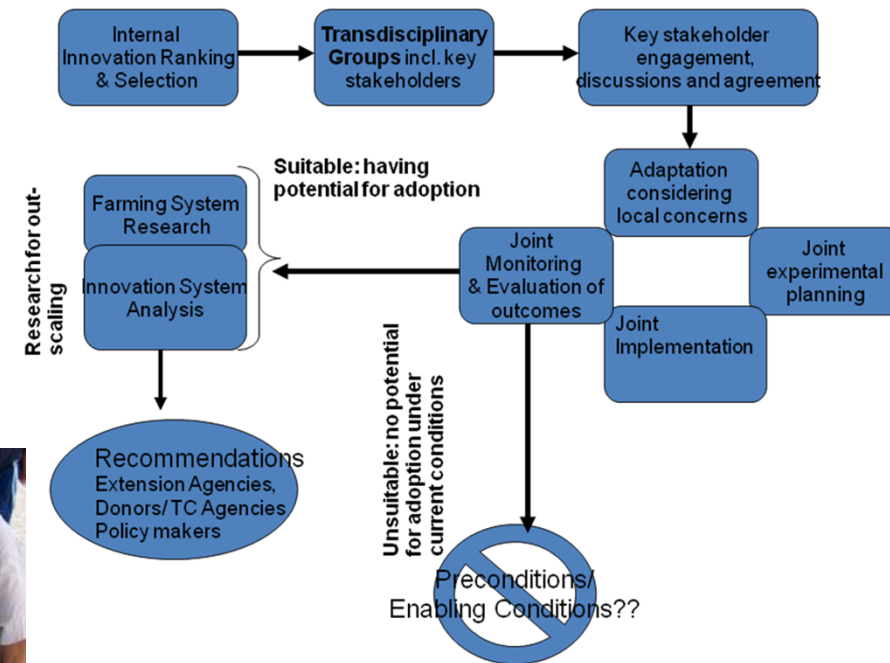
# Social Construction of Science & Technology

“Innovation is about simultaneously shaping technology and building society.” (Bijker & Law, 1997)

**‘Follow the Technology’** (Douthwaite et al, 2001)

- Technology with ‘plausible promise’
- Real-life experimentation with innovators
- Process of trial, selection, improvement, outscaling

## Step-wise Follow the Innovation-approach





# Step-wise FTI-approach

## Selected Innovations

- **Afforestation** on marginal/ degraded lands
- Advanced tools for rapid **salinity assessment** & improved **irrigation scheduling**
- **Conservation of Agriculture** (incl. precision leveling, intermediate tillage, permanent beds, residue & nutrient management)
- **Strengthening Water Users Associations** through SMID-approach

## Output:

**Team Formation, Stakeholder Selection, Roadmap Writing**

**Process Documentation, Innovation further development, partly diffusion & (academically) concept development**





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# Thank you!



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