



Berlin Workshop in
Institutional Analysis of
Social-Ecological Systems

The Impact of Nature-related Transactions on Action Situations and Emerging Institutions

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Guiding Ideas (1/2)

- **Institutions of Sustainability:** ideas taken from New Institutional Economics, Institutional Analysis and Development Framework, Agrarian Institutions Theory, Classical Institutional Economics
- **Reconciling the Actors and the Systems Approach** – the mediation theorem and what it means in terms of transactions and transformations
- **How to translate this into the dynamics of interaction** – reframing the **action situation**

Guiding Ideas (2/2)

- Nature-related **Transactions in social-ecological systems are different**
- **Properties of transactions and the actors' interdependence** associated with them need to be characterised and classified **differently**
- **Institutions and governance structures** for governing nature-related transactions also **differ** from those existing in less nature-related cases
- Dichotomy of **Integrative & Segregative** Institutions

Either Actors or Systems Approach?

- Actors vs. systems? Not useful in institutional analysis of social-ecological-technical systems
- Bilateral relationship of actors “**makes it simple**”
- **Too simple**, misses core reasons how institutions arise in social-ecological-technical environments
- Transaction/interaction directly between humans?
- **Mediated** through larger systems:
 - Natural systems (ecological, hydrological, etc.)
 - Technical systems (engineered, infrastructure)
 - Social systems (family, states, companies, etc.)

Interplay of Transactions and Transformations

- Mediation through systems entails an interplay of transactions and transformations
- Transactions are **affected** by ongoing transformations and may **cause** transformations
 - Natural systems: e.g., erosion processes
 - Technical systems: e.g., technical innovation
 - Social systems: values - evaluative criteria
- AND: these systems may **be different in terms of modularity and functional interdependence**

Modifying Institutional Economics

We use elements from New and from Classical Institutional Economics as follows:

- Physical Transaction
- Social Transaction
- ➡ **Reconciling these two views**
- Principle of discriminative alignment
- Extending typology of transaction attributes
- ➡ **Beyond a predefined set of stylized governance structures**

Dimensions of the Transaction

- **‘Ex-ante institutional change perspective’** - a physical transaction is planned without being institutionalised – instead of an **‘ex-post institutional change perspective’**
- **Decompose the process** into stylised steps to show how physical transactions become **institutionalised**
- **Institutionalised transactions** represent transfers of entitlements or constraints on goods or resources
- In this view, transactions ‘are the alienation and acquisition between individuals of the rights of future ownership of physical things’ (Commons, 1934: 58)

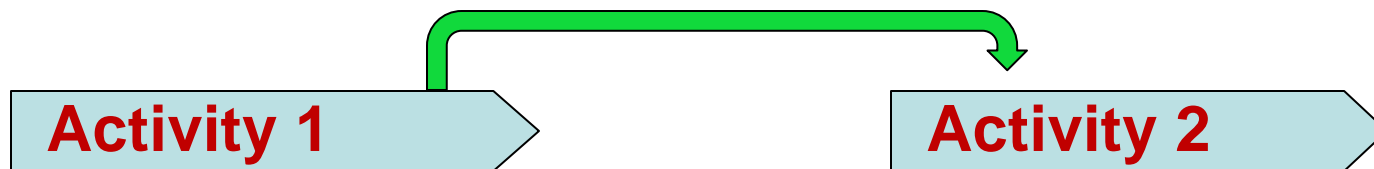
Decomposing the Transaction 1/4

Starting from the **physical** definition:

- 'A transaction occurs when a good or service is transferred across a technologically separable interface. One stage of activity terminates and another begins' (Williamson 1985: 1).
- Emphasis on **frictions** between activities which explain the need for a transaction to be governed by institutional and organisational arrangements
- By contrast, **linkages** between activities are equally important reasons why transactions require institutions and governance structures.

Decomposing the Transaction 2/4

FRICITION as a problem of transaction



In engineered systems a **focal transaction** can often be considered in isolation because the actor's choice does not cause other transactions

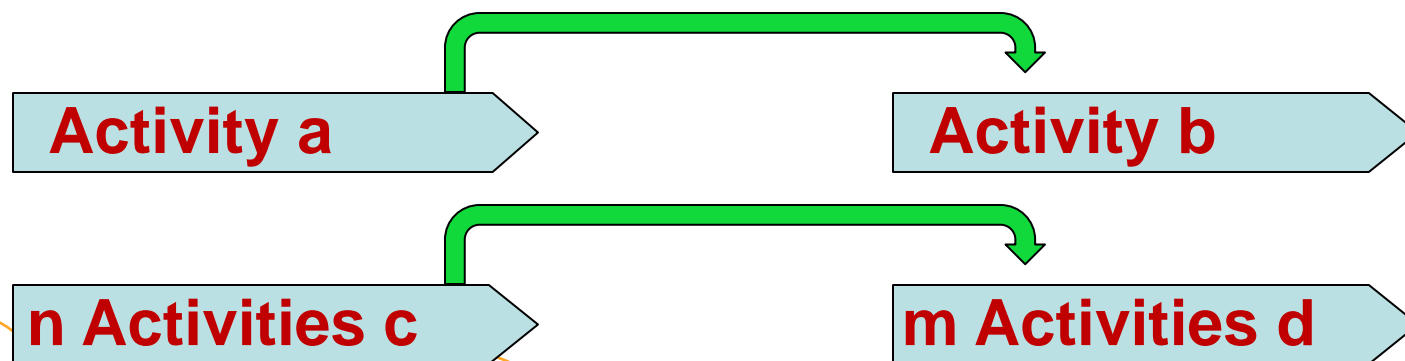
Example: cars

Decomposing the Transaction 3/4

In natural systems a focal transaction can often not be separated from linked transactions which the actor cannot avoid to cause by his choice

Example: wheat

COHERENCE as a problem of transaction



Decomposing the Transaction 4/4

- Whether **frictions** or **linkages** are considered the most relevant transaction problems depends on the of systems where a theory of transactions has been developed

Decomposability	Transaction Problem	System Characteristic
High	Friction	Engineered
Low	Coherence	Natural

SES-specific Properties of Transactions



- ▶ **Additional properties of transactions** to be taken into account by nature-related institutional analysis:
- ▶ **Jointness and absence of separability, coherence and complexity, limited standardisability and calculability, dimensions of time and scale, predictability and irreversibility, spatial characteristics and mobility, adaptability and observability, etc.**



Transaction Attributes in Agrarian Institutions Approaches

- Agricultural production is closely connected with ecological, biological, climatic processes
- Farming activities have *particular properties*:
- *Diversity and heterogeneity, dependence on varying ecological, biological, hydrological and weather conditions, spatial dimensions, seasonality, timeliness of activities*
- Therefore agricultural activities are difficult to be organized by standardized processes (Günther Schmitt).

The Family Farm

- **Low transaction costs** of family labor compared to non-family operations (Schmitt)
- Compensation system difficult, problems of measurability due to nature of farming
- ➡ Decentralised governance: actors = farmers take their own decisions - autonomous action!
- ➡ And *a/so* individualized governance: actors = farmers are responsible for their decisions

Structural Modularity and Functional Dependence 1/2

- General idea: **inter-module interactions** are less relevant than **intra-module interactions**
- Modularity only indicates **structural interconnectedness** of modules - reflects how likely *immediate* effects between two modules may be at the moment
- It does not say anything about **dynamic relationships** between modules *over time*, which determine how changes in one module affect changes of another module
- These relationships reveal the extent of **functional dependence** of a module on another module.

Decomposing the Transaction 4/4

- **‘Near-decomposability’**: Simon (1969) analysed systems ranging from business organisations to biological systems
- ‘The property of complex systems that enables each of their subsystems to perform most of its activities with only weak impact upon, and interaction with, its other modules’
- **Modularity** : notion of *building blocks* and *additive partitions* (de Jong, Thierens and Watson, 2004: 2); precondition for strong decomposability
 - ▶ Additive partitions: associated with **separability** of modules
 - ▶ **But** this not only depends on **structural interconnectedness**, but also on **functional dependence**

Structural Modularity and Functional Dependence 2/2



- 'Structural modularity does not imply isolation, or near independence, of the dynamical behaviour of modules' - 'One module may be strongly and nonlinearly sensitive to small state changes in another module despite being sparsely connected' (Watson, 2002: 1ff.).
- **Concrete example: greenhouse effects on climate**
- **A system's structural modularity should not be confused with its functional behaviour**
- Low structural modularity and decomposability may be associated with different degrees of functional interdependence of processes at different scales

A Heuristic for Ordering Nature-related Transactions 1/3

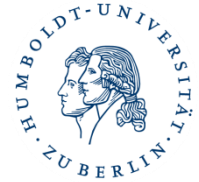


1. **Atomistic**: transactions that occur physically within structures with **high modularity and decomposability** – transactions **rather easy**
2. **Complex**: structures with **low modularity and decomposability** imply that the subunits are multifaceted aggregates - transactions **more difficult**
3. **Isolated**: transactions that occur physically by processes with **low functional interdependence** - transactions **rather easy**
4. **Interconnected**: processes with **high functional interdependence** - transactions **more difficult**

A Heuristic for Ordering Nature-related Transactions 2/3

	Modularity and decomposability of structures		
		High	Low
Functional interdependence of processes	Low	Atomistic-isolated transactions	Complex-isolated transactions
	High	Atomistic-interconnected transactions	Complex-interconnected transactions

Transaction-Interdependence- Institutions Nexus (1/2)



- ... ‘... **align transactions** (which differ in their attributes) **with governance structures** (which differ in their costs and competencies) in a discriminating ... way’ (Williamson, 1996: 46f.).
- ➡ **But:** discriminative alignment has to include **more attributes of transactions** for natural systems than for systems engineered by humans
- ➡ **And:** Transactions and their properties are often subjected to physical transformation when they are mediated through natural systems
- ➡ **Several implications – see next page!**

Adding Institutional Diversity and (Networks of) Actions Situations



- ❑ Discriminative choice of predefined governance structures (market, hierarchy, hybrid) insufficient
- ❑ Instead “crafting institutions” due to diverse and complex transactions and transformations
- ❑ Plurality of transaction and transformation impacts goes beyond bilateral interdependence
- ❑ Instead multilateral interdependence requires the “action situation” as an extended perspective
- ❑ Even more: “adjacent”, “networks” or “ecology” of action situations – boundaries difficult

Reframing the content of “action situation”



Micro-Foundations

- ❑ IAD has endogenised micro-foundations of the social world - the impact of actors' characteristics (such as knowledge) on the action situation
- ❑ Properties of physical transactions (i.e. resource characteristics) on the action situation exogenous
- ❑ They are **not directly integrated into the game-theoretical logic of the IAD action situation**
- ➡ IAD could assume the concept of Nature-related Transactions for representing the relevance of the physical world: the ecological and technical dimension

Actors Attributes Endogenous

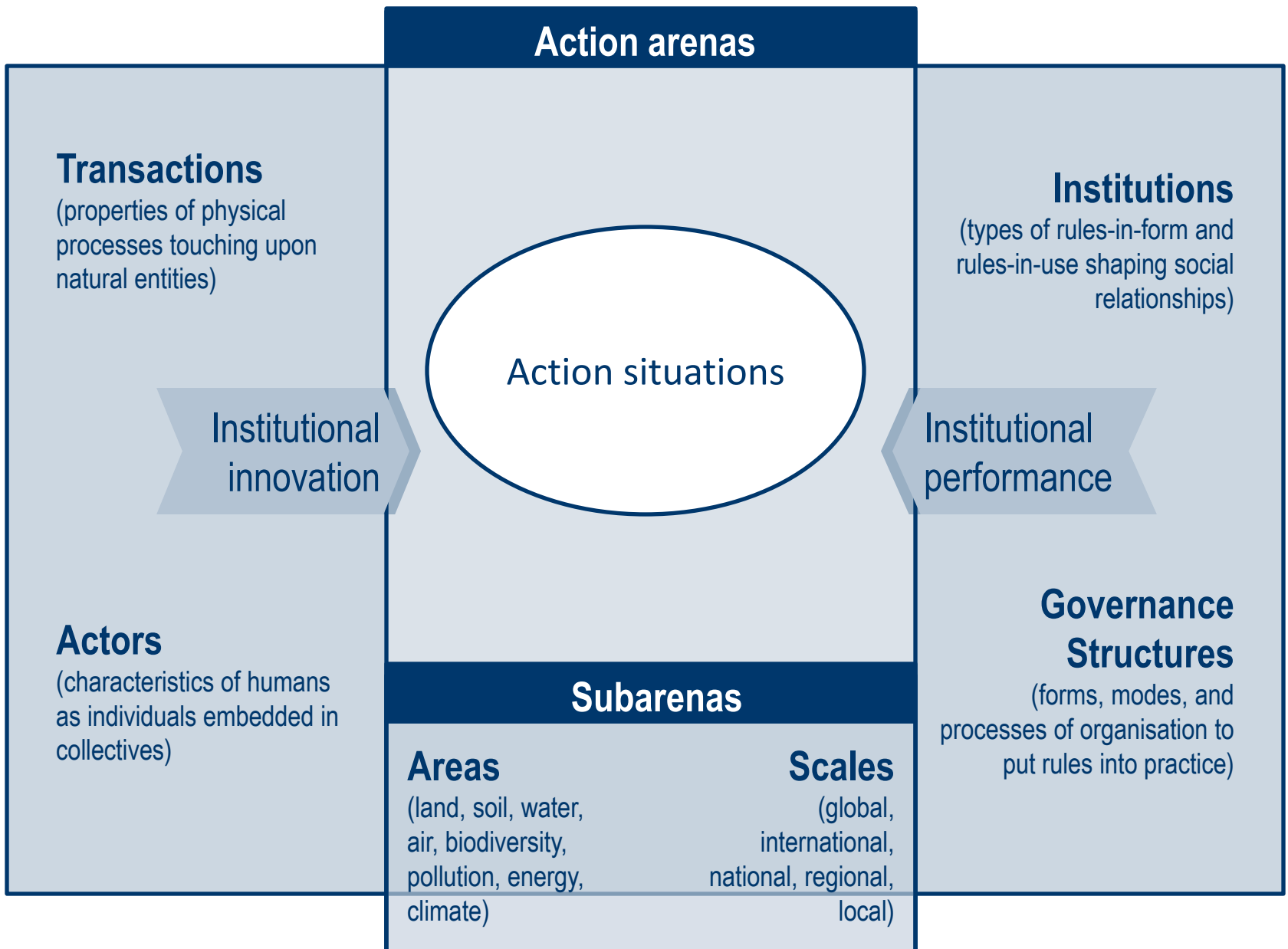
- **“Unpacking the action situation”** (Ostrom 2005) shows how attributes of human actors affect actors’ interdependence and thus influence the action situation.
- “The set of participants, the positions to be fulfilled by participants, the potential outcomes, set of allowable actions and the function that maps actions into realized outcomes, the control that an individual has in regard to this function, the information available to participants about actions and outcomes and their linkages and the costs and benefits – which serve as incentives and deterrents – assigned to actions and outcomes”.

Also Physical Attributes Endogenous



- **“Unpacking the action situation”** equally refers to the activating role of physical transactions:
- The set of participants implementing their decisions in their **physical** environment, their positions in the natural and technical context, set of physically feasible changes, the potential nature-related transactions, the transformation function that maps activities into completed changes, the physical access that an individual has in regard to this transformation function, the technology and infrastructure available to participants to produce changes and their linkages and the beneficial and adverse effects – which serve as incentives and deterrents – assigned to activities and outcomes







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THANK YOU
for your attention!

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