

Interrelations between institutions and technology

Autumn school:

Concepts, frameworks and methods for the comparative analysis of water governance

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Economics of Infrastructures

Overview

- How to relate technology to institutions?
- Institutional economic perspective
- Our framework

How to relate technology to institutions?

- Framing:
 - Institutional economic perspective
 - Infrastructures as socio-technical systems
 - Need for coordination (network complementarities)
 - Focus on critical technical functions

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Different schools of thought

- Neoclassical economics
- New institutional economics
- Original institutional economics

Actors in neo-classical economics

- Rational behavior, optimizing profit or utility
- Perfect information (ex ante)
- Price signals provide all important information ('invisible hand')
- Competition as selection mechanism (ex post)
- The efficient outcome is predictable by theory
- Determinism and 'single exit' situations
- Actors are reactive "price-takers"

Actors in New Institutional Economics

- Limited rationality and opportunistic behavior
- Actors strive to minimize transaction costs and production costs
- Transaction deals with the transfer of property rights
- Technology and some 'external' institutions (institutional environment) are given

The explanatory model of New Institutional Economics

- Endogenous ('explanandum'): institutional arrangement, 'governance structure'
- Exogenous: properties of actors, institutional environment, features of the transaction.
- Comparative static analysis

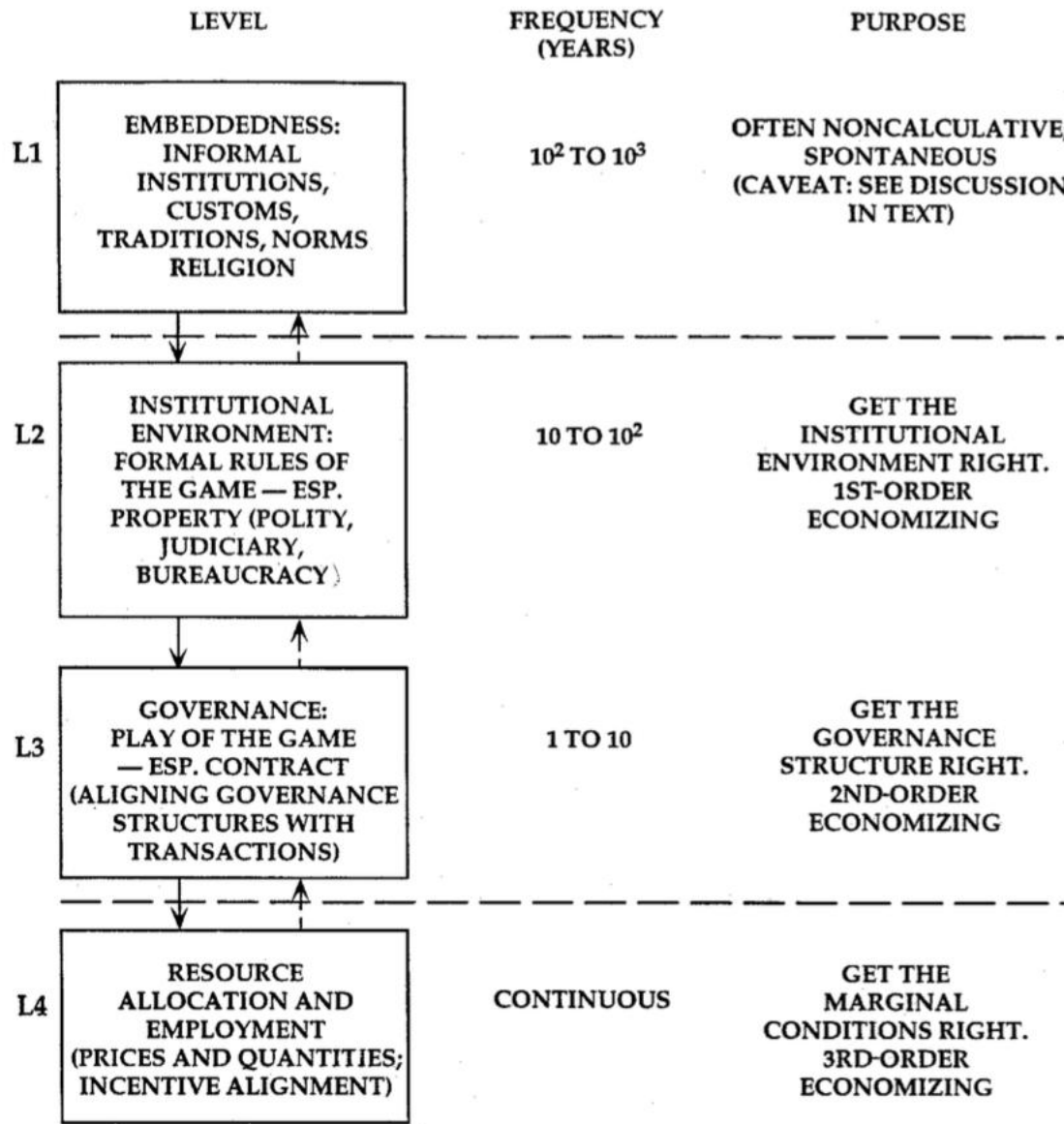
Original Institutional Economy

- How and why do institutions change ?
- Oriented towards processes of change
- Interactions between actors and actors with structures
- Various different structures might be relevant at the same time
- Holistic approach: the systems and its evolution is the object of analysis

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ECONOMICS OF INSTITUTIONS



L1: SOCIAL THEORY
 L2: ECONOMICS OF PROPERTY RIGHTS
 L3: TRANSACTION COST ECONOMICS
 L4: NEO-CLASSICAL ECONOMICS/AGENCY THEORY

Williamson 1998

Level	Economics of technological practice	Frequency of change (years)	Purpose
<i>1</i>	<i>Technological paradigm</i>	> 100	Often non-calculative and spontaneous
<i>2</i>	<i>Technological trajectory</i>	10–100	First-order economizing: development of coherent and efficient technological systems
<i>3</i>	<i>Routines</i>	1–10	Second-order economizing: Optimization ²⁵ of individual technical components
<i>4</i>	<i>Operation and management</i>	Continuous	Actual operational management

Level	Economics of Institutions	Economics of Technological Practice
1	Embeddedness	Technological paradigm
2	Institutional environment	Technological trajectory
3	Governance	Technological routines
4	Resource allocation and employment	Technical management and operation

How to relate technology to institutions?

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- **Need for coordination (network complementarities)**
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Local energy system

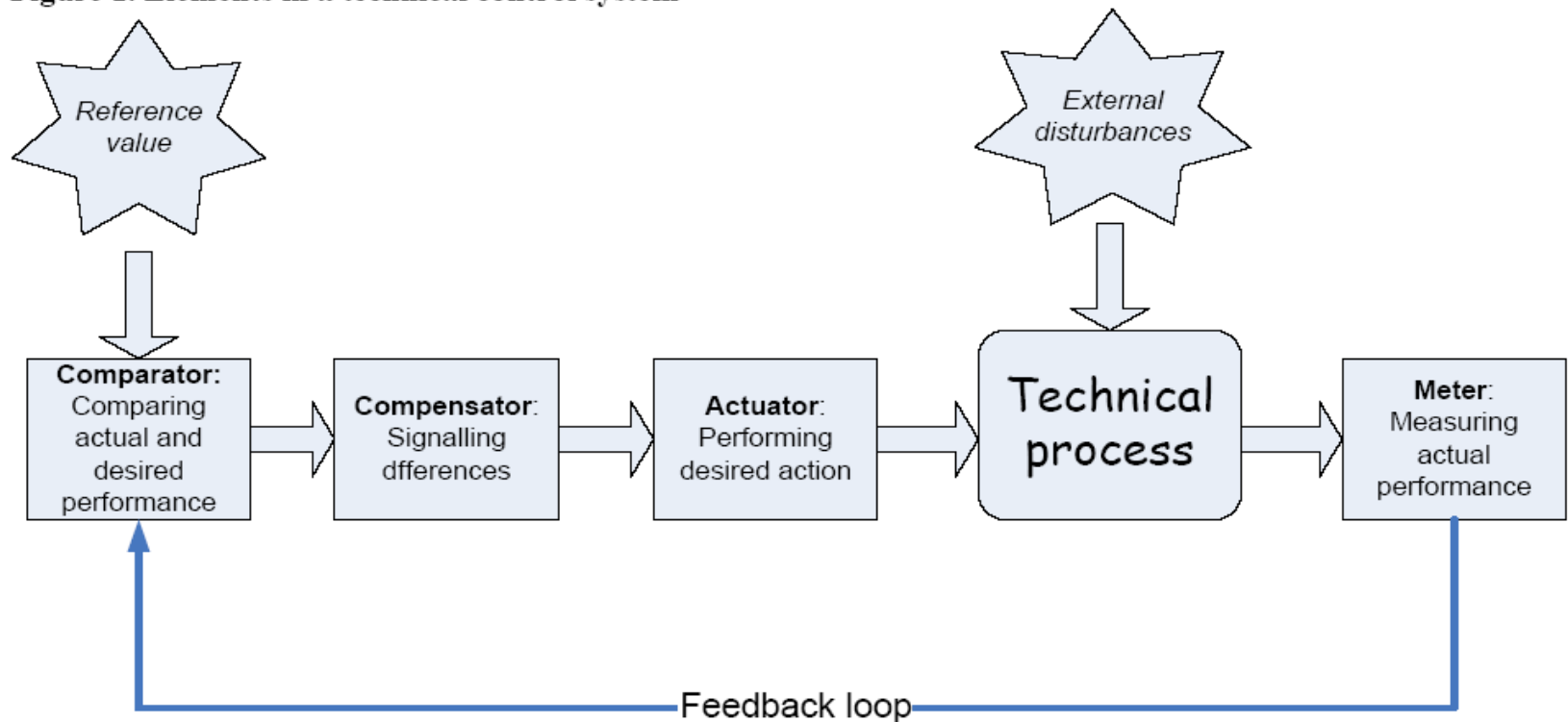


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Control engineering perspective

Figure 1. Elements in a technical control system



Critical functions

- System control
- Capacity management
- Interoperability
- Interconnection

