Governance and the Role of the State in Socio-Technical Change

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Background and Motivation

- Socio-technical systems transform not at all, too slowly, or in wrong directions
- Many – and increasing – claims for (innovation) **policies** to **initiate and support transitions**
- Transformational policy (Schot/Steinmuller), Mission policies (Mazzucato, EU Commission etc.)

Background and Motivation

- Socio-technical systems transform not at all, too slowly, or in wrong directions
- Many – and increasing – claims for (innovation) **policies** to **initiate and support transitions**
- **Challenge oriented** policies, **Transformational** policy (Schot/Steinmuller), **Mission** policies (Mazzucato, EU Commission etc.)
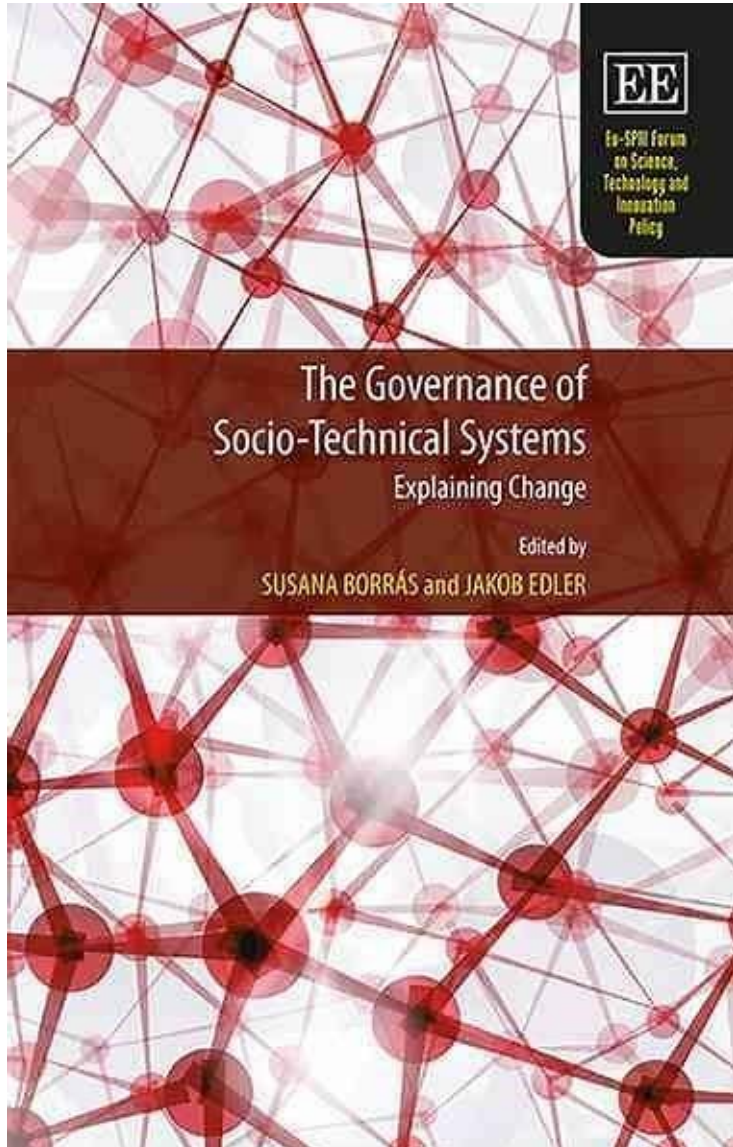
but

- socio-technical systems **differ**
- transformational processes are complex, unpredictable, multi-dimensional
- **governance** of change **complex** and **idiosyncratic**

thus

- role of state differs

- ➢ **Conceptualisation of role of state** to analyse and design constructive policies as part of wider governance of change

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We did some foundational work…

The Governance of
Socio-Technical Systems

Explaining Change

Edited by
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Socio technical systems

- Definition:
    - Ensembles of **social and technical elements** that
    - **interact** with each other in a distinct way,
    - with specific forms of **knowledge/technology production** and **utilization** (practice, capabilities etc.).
    - oriented towards **specific purposes** in society and economy

- **… under constant pressure to change** (or resist change) due to
    - uncertainties of new knowledge and innovation production and resulting threats/opportunities
    - new and contested (re-)interpretations of challenges and role of STI
    - normative changes/tensions in society

- **Ambiguity and instability:** implication for governance of change

Governance

- the **interplay** of the different ways in which **public and private agents intentionally interact** in order to influence, promote or inhibit socio-technical change

- **limits** of statist "steering"
  - society becoming more complex, dynamic and diversified
  - social systems dynamics determined by all kinds of institutional, cultural, technological and other factors.
  - political institutions and actors have limits to 'steer'

- Concept of purposefulness
  - vs. emergent, de facto, tentative governance…

Differentiation of governance

- Governance constellations **differ** in different **actor constellations**
    - **Who drives**: **state** vs **non state** actors
    - System: **hierarchical** (dominated by a few) vs **heterarchical**

	Driven by state actors	Driven by societal actors
Hierarchical, dominated		
Heterarchical, non dominated		

Four stylised governance modes

	Driven by state actors	Driven by societal actors
Hierarchical, dominated	Command and Control	
Heterarchical, non dominated		

Four stylised governance modes

	Driven by state actors	Driven by societal actors
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Four stylised governance modes

|	Driven by state actors	Driven by societal actors
Hierarchical, dominated	Command and Control	Dominated self-regulation ("oligopoly")
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Four stylised governance modes

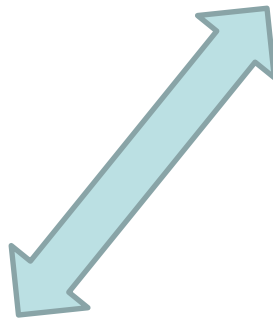|	Driven by state actors	Driven by societal actors
Hierarchical, dominated	Command and Control	Dominated self-regulation ("oligopoly")
Heterarchical, non dominated	State actors as primus inter pares	Self-regulation

Three pillar model to analyse governance of change

Agents and opp. structures

Who and what drives change?
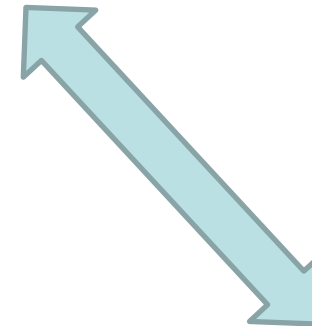
Instrumentation:

How is change influenced?

Legitimacy:

Why is it accepted?

Opportunity structures & capable agents

Lead question: Who and what drives change?

- The **co-evolution of knowledge/technology** and **institutions** (regulatory, cognitive, normative) sequentially or simultaneously **generate opportunities (for change)**

- **Agents** are able to trigger change by co-creating and/or making the most of new opportunities

- Agency and institutions essential in the dynamics of governing change
  - Institutions: enabling or constraining frameworks for action
  - Governance of change in a system: mutual transformation of institutional frameworks and **agents' behaviour**

- Primary agents of change: firms (supply - demand), inventors, researchers, policy entrepreneurs, consumers, civil society organisations....
- Capabilities: material resources, discoursive resources, power positions

Instrumentation

- **Lead question**: how do agents and institutions influence scope and direction of change?

- Instruments: **no neutral tools**, but frame problems and offer „solutions", providing (implicitly) orientation, boundary spanner
- **Public** and **private** instruments
- Governance of change depends on / characterised by **the interplay and take up of instruments**

- Understanding direction of change needs to understand all instrumentation and their inter-linkages
- Instruments can pull in different directions (ambiguity / interests)

- Holistic approach: Connecting
  - traditional (and interactive) public policy (political science)
  - societally driven governance instruments (STS)

Legitimacy & acceptance

- **Lead question: Why are ST&I systems (not) accepted, and why is the governance of ST&I system change (not) accepted?**

- SocTI Systems are legitimate if they enjoy wide social acceptance and support

- Political science: **two types of legitimacy**:

  - **input**: representation-participation (procedural, inclusion),
  - **output**: results (effectiveness, delivery).

Legitimacy & acceptance

- **Poor legitimacy in one dimension**
  - renders systems **unstable**
  - **might trigger** purposive **action** towards change
  - increases contestation within change

- **In-built legitimacy challenge** of change:
  - increase of ambiguity about performance of current or future systems
  - inherent contestation, perceived losses, path dependencies…

  - …input legitimacy becoming more important
  - …but more problematic because of diversity and breadth of (*novel*) instrumentation (with unequal access, different levels of accountability/ transparency etc.)

Three pillar model

Agents and Opp. Structures: Who and what drives change?

Who are the primary agents of change?

What is their capacity to induce/inhibit change?

What capabilities do they have (resources and interpretative abilities)?

What is the distribution of the agents' capabilities within the system?

Instrumentation: How is change influenced?

What are the instruments used, by whom? How are they implemented?

How are instruments shaped?

How do public and private instruments interact?

How and why do they "work" or not work and how do they interact with other instruments?

What are instrumental tensions, how are they resolved (if at all)?

Legitimacy: Why is it accepted?

What are challenges for legitimacy arising out of the actor arenas and the poly-centrality of governance?

What is the cultural embedding of governance instruments and how does it change over time?

How socially accepted are the governance processes and outcomes, and why is this?

How is contestation of outcomes and processes dealt with?

Applying the framework to four governance situations

	Driven by state actors	Driven by societal actors
Hierarchical, dominated	Command and Control	Dominated self-regulation
Heterarchical, non dominated	State primus inter pares	Self-regulation

Empirical Illustration

Applying the framework to four governance situations

	Agents	Instruments	Legitimacy	Role of State
Command and control (Nuclear)				
Oligopoly (Automated Driving)				
Self regulated (Cruptocurrencies)				
Primus inter pares (Smart Cities)				

Empirical Illustration

Applying the framework to four governance situations

	Driven by state actors	Driven by societal actors
Hierarchical, dominated	Command and Control Nuclear Energy	Dominated self-regulation Automated Driving
Heterarchical, non dominated	State primus inter pares Smart City	Self-regulation Cryptocurrencies

Nuclear Energy

- Using example of major changes (e.g. phasing out of Nuclear (Energiewende in Germany) to showcase the core role of the state and of political processes to influence state decisions.

- **Concentrated** actor landscape

- Hierarchical, **state** as regulator, financier of research, provider of necessary infrastructure for distribution and waste management.

- Major change of the way nuclear power is produced and used is **dominated by government decisions** and actions**, regulation top down, funding of alternatives**.

- High normative / material stakes

- Political processes of lobbying

- Enabled by **strong societal movement** based on concerns around energy security and health and safety issues.

- Legitimacy amongst contestation

Automated Driving

- **Changes** for transportation systems and society **profound**, potentially first paradigm change in individual transportation since early 20th century

- Trajectory of change determined by technological readiness, regulation, infrastructure and public trust

- System and systems change dominated by a **limited number of powerful economic actors** form different sectors (Car manufacturers,Google, Apple, Uber), offering a variety of **architectures for automated vehicles**

- **Role of the state** as facilitator and regulator
    - allow/**pilot schemes** (e.g. City level, Gothenburg, Helsinki) and **support R&D**
    - provide **infrastructure** updates to prepare the roll out (national level, e.g. UK).
    - **catching up** for economic benefits

- Industry providing **new narrative** of mobility, **dominate** change process

- rather **little contestation** (so far), but rather low outcome and input **legitimacy**,

Smart City

- Generic label for **explicit initiatives** largely **driven by city authorities** to take advantage of **combined** smart digital technologies and data analytics for the provision of public services such as transport and energy

- Actor landscape highly diverse and rich
- Governance of change **heterarchical**.
  - state, the city government, **initiator, enabler, lead user**, often supported with EU, national or regional programme funds (multi level)
  - most initiatives within smart city umbrella governed through interplay of variety of actors and instruments
  - often public private **partnerships,** a range of actors from industry and different city-regional government departments and agencies.

- Societal engagement localised, but level and meaning of engagement?
  - input legitimacy appears limited (strangely)
  - output legitimacy
- Some contestation

Cryptocurrencies

- Allowing **automatic verification** of transactions.
- with **highly secure** end-to-end information chain, verifiable authenticity and immutability of digital documents using blockchain technology
- Technology is potenitally highly **disruptive,** high level of **uncertainty, global**

- Highly **diverse landscape**, more than 1000 cryptocurrencies. Bitcoin (2009) largest, approx. market capitalization of 130b USD.

- Socio-technical change driven by **non-state initiatives** involving a large number of societal actors, decentralized, both on supply and demand side, uncontrolled.
- **Suppliers** mobilise **trust** and **technological communities** and new **narrative**

- Governments
  - Catching up, damage limitation, in search for regulation of global phenomenon
  - Launching own currency, following trend (Venezuela, Turkey, Russia, Sweden?)

- Weak process legitimacy
- As yet low contestation, strong followers, apathy, shadow of contestation to come

A first exploration

	Agents	Instruments	Legitimacy	Role of State
Command and control (Nuclear)	Concentrated (public and firms) Strong Cvil Society Organisation (CSO)	Narrative Funding Regulation	Medium outcome l. Medium input l. High contestation	Initiator Regulator
Oligopoly (Automated Driving)	Concentrated (private firms) Weak CSO	Experimental Narrative Regulation	Low outcome l Low process l Low contestation	Regulator (Gatekeeper) Opportunistic
Self regulated (Cruptocurrencies)	Distributed Strong (if small) CSO	Discoursive Community Mobilisation	High outcome l. Medium process l. Low contestation	Observer Damage control Opportunistic (a few)
Primus inter pares (Smart Cities)	Distributed (private firms, public agencies, research organ.) Weak CSO	Experimental Acquisition Narrative	Medium outcome l Weak process l Some contestation	Moderator Lead user Enabler

Conclusion

- Work in progress…

- Highlighting **structurally different roles of the state** in the process of governing change
- …along four stylised modes of governance in four different socio-technical systems and their actor and power constellations

- State
  - different competencies, ressources, instrumentation
  - different relative leverage, "power position"

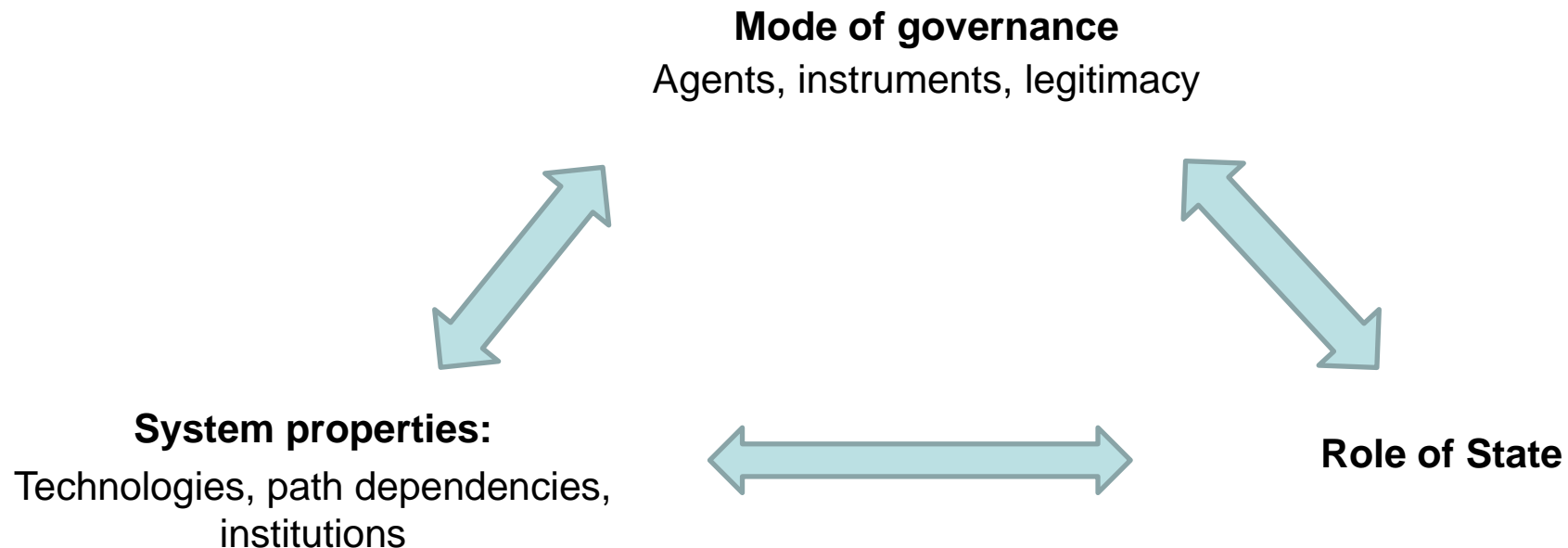 - importance of level of contestation and legitimacy attribution

Conclusion

- Complementing aspects – the approach…

  - **Political science**: We take attributes of socio-technical system into account

  - **STS**: We focus on purposefulness, intentional state action (and its limits), interplay of "instruments"; needs to take account of STS insights

  - **Economics**: We further differentiate the classical role of the state regulating, distributing, stabilizing

- Hopefully:

  - supporting theory-building about the transformative role of the state.

  - Helping to make policy makers, academics and the public more aware when it comes to demands for the state to drive and govern change.

Future

- **Abstractions**: Relationship modes of governance and role of the state
- Take into account **broader conditions**: three lateral relationships

Mode of governance
Agents, instruments, legitimacy

System properties:
Technologies, path dependencies,
institutions

Role of State

- Future research agenda:
    - Variation over time of governance modes
    - Variation within each mode of governance

Instrumentation: two perspectives

1) Public Policy perspective, state as main agent

   - **Broad spectrum** of public policy instruments
     - Hard (regulation, legislation) vs. soft
     - Command/control; incentive based; persuasion
     - Top down vs. participative, discursive
     - Initiative vs reactive
   - **Three main rationales**: State acts in order to

     (1) correct market failure,

     (2) correct systems failure, or

     (3) achieve certain missions/goals
   - Instruments not only influence societal actors, but **regulate relation** between state and societal actors
   - Important: **role of societal actors** in defining and implementing policy instruments (interactive governance)

2) Broader perspective – STS tradition:

- the **entirety** of **regulatory, cognitive, normative rules** (institutions, Scott) affect actor behaviour

- instrumentation comprises all action and interaction that establishes, enforces or changes those three levels

- state not (necessarily) main actor, but firms, NGOs, Third Sector, consumers...: heterarchic, often state moderated

- instruments:
  - interactive learning, discursive, foresight, CTA
  - corporate strategies, voluntary (self-binding) agreements, code of conducts etc.
  - „emergent", „adaptive", „anticipatory" , „distributed"