Transition Studies:
A PhD guide into the wild

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Outline

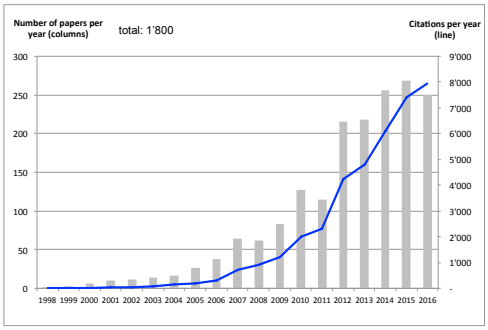
1. Transition studies: The emerging field
2. What are transitions?
3. Traps in transition studies
4. Multi-level perspective: core idea & challenges
5. Technological innovation system: core idea & challenges
6. Examples of recent research
7. Wrap up

1 Transition Studies

Transition studies: a novel research field

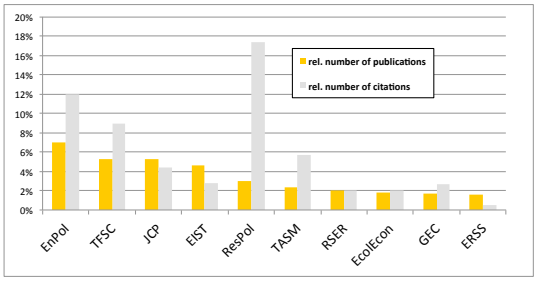
- Yearly conference:
  8th International Sustainability Transitions Conference, June 18-21, Gothenburg
- Frequent workshops, incl. PhD schools ☺
- Dedicated journal: EIST
- STRN research network
  > 1'200 members, website, mailing-list, newsletter
- Mission & research agenda

Academic output 'Sustainability Transitions'

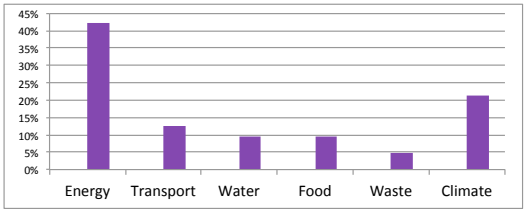


Date: Dec 2016; Method: Markard et al. 2012

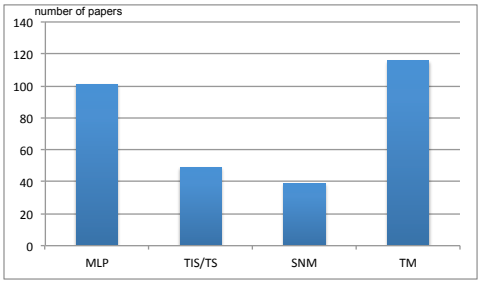
Key journals in the field



Key topics



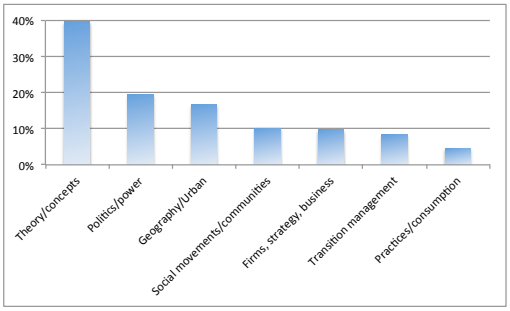
Key frameworks



Major research areas [STRN 2010]

- How to explain past transitions? Conditions for different pathways?
  [e.g. Geels 2002, 2005; Geels & Schot 2007; Geels et al. 2016: Smith et al. 2005]
- How to explain success and failure of novel ('green') technologies?
  [e.g. Bergek & Jacobsson 2003; Bergek et al. 2015; Jacobsson et al. 2004; Negro et al. 2007]
- What role for policies in ST? How to govern/manage transitions?
- Role of (incumbent) actors in ST. Politics of transitions.
- Role of social movements, grassroot initiatives, local communities.
- Geography of transitions: How to ST unfold across different scales & places? Transitions at the urban scale
- Transitions in everyday life, practice theory.

Key frameworks



2 What are transitions?

Key concepts

- Sustainability Transition
  Long-term, multi-dimensional & fundamental transformation of large socio-technical systems towards more sustainable modes of production & consumption [Markard et al., 2012]

  → time, scale, scope, direction, systemic, technology ...
- Socio-technical system
  Network of actors, institutions and technology; provides essential service for society (e.g. food, energy, transport) → includes actors, 'sector'-level
- Socio-technical regime
  Complex of scientific knowledge, engineering practices, process technologies, product characteristics, skills and procedures, established user needs, institutions and infrastructures [Hoogma et al. 2002] → emphasis on coherence & inertia

What is a transition?

- Diffusion of photovoltaics in California
- Global diffusion of mobile/smart phones
- Emergence of electric vehicles
- Phase-out of nuclear power in Germany
- Transformation in Eastern European countries 1980s & 90s
- Introduction of container based sanitation options in slums of Nairobi
- Abolishment of Apartheid regime in South-Africa
- ICT revolution
- Internet of things

Particularities of sustainability transitions

[Kern & Markard, 2016]

- Value-laden & contested
  → e.g. trade-offs such as low-carbon vs. nuclear risks; conflicting views
- Key role for public policies
  → purposive transitions, associated with sustainability targets
- Power & politics central
  → vested interests; winners & losers; coalitions & alliances
- Complex, uncertain, long-term
- Context dependent: different pathways
- Multi-dimensional, systemic interaction
  → e.g. interaction of multiple technologies

3 Map of traps

1. A map of traps

- Interdisciplinarity
  - ➢ True, ST provide more holistic view than mono-disciplinary accounts
  - ➢ But:
    - 'Isolationist' tendencies in the community → It's all in my earlier writings!
    - Reinventing poor copies of old wheels → ad hoc theorising
    - Risk of being side-lined by mainstream disciplines → e.g. ETIS
- Conceptual heaviness
  - ➢ True, ST is by some perceived as a "theory of everything"
  - ➢ But:
    - Lack of clear definitions, too much jargon → e.g. micro-macro confusion
    - Weak modularity in the frameworks → How would an MLP 2.0 look like?
    - Poor specification of (micro) mechanisms → e.g. structure-agency problem more averted than actually resolved

2. A map of traps

- Empirical messiness
  - ➢ True, transition concepts provide a systemic view on transformations
  - ➢ But:
    - Delimitation of systems is a largely unresolved issue (geographically, technologically, actor wise, ...)
    - Operationalization of concepts is poor → Comparison between related empirical studies often impossible
    - Methodological discussions relatively muted
- Normativity
  - ➢ True, transition studies promise to help saving the world
  - ➢ But:
    - Policy concepts derived too hastily → accusation of techno-determinism
    - Normative aspects are not elaborated explicitly enough → What is «sustainable» in the transition?
    - Normative topic → doesn't mean research should be sloppy

3. How to avoid being caught

- Interdisciplinarity
  - ➢ Build bridges/stand on two legs
- Conceptual heaviness
  - ➢ Be constructive critical and intellectually bold
- Empirical messiness
  - ➢ Be obsessed with methodological rigor
- Normativity
  - ➢ Don't treat normative problems too naively
  - ➢ Develop better policy advice from transition theories

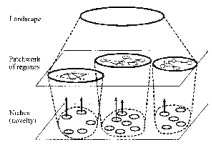
4. How to avoid being caught

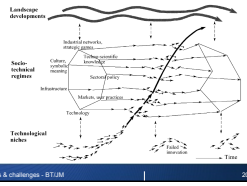
- Promising fields of engagement
  - Conceptual renewal
    - Sectoral dynamics: regime destabilization / bridging markets
    - Micro-foundation: actor strategies and institutional dynamics
    - Spatial characteristics: globalization and relational space
    - Policy: Broadening transition management (small caps!)
  - Methodological and empirical novelties
    - Modeling complex systems
    - Better empirical protocols
    - New application areas (urban water management, health, …)
    - Transposition into new regional contexts (e.g. emerging economies)
  - Positioning/mainstreaming transitions research
    - Political Sciences/Governance
    - Neo-Institutionalism
    - Geography
    - Management

4 Multi-level perspective

Core concepts: MLP

- The sirenic allure of the Multi-Level Perspective (MLP)
  - Socio-technical regimes
    - Highly institutionalized core structure in a socio-technical systems
    - Prone to major path dependencies, ruling out disruptive alternatives
  - Technological niches
    - Emergent and immature socio-technical systems that need protection for learning and alignment
  - Socio-technical landscape
    - External factors impacting the regime





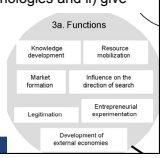
MLP Challenges/traps

- Poor operationalization of concepts
- Structure and agency
- Levels are not levels
- Geography unclear*
  - Are regimes global and niches local? Or the other way around?
  - How to identify spatially delimited structures? Is there a national variety of regimes?
- Better conceptualization of regimes and niches*
  - When is a niche a niche? What about multiple technologies in a niche? What if incumbents are part of a niche?
  - What if regimes are only semi-coherent and there is more than one regime in a sector? How can we determine the strength of a regime? And niche-regime is not a dichotomy
  - Incumbents: Multiple roles – opponents & drivers of change
    [Bergek et al. 2013; Berggren et al. 2015]
- Policy implications: SNM, TM, others…*

5 Technological innovation systems

TIS basics

- Definition
  "set of networks of actors and institutions that jointly interact... and contribute to the generation, diffusion and utilization of variants of a new technology..."
  [Markard and Truffer 2008]
- Main characteristics
  key role for institutions, emergent effects, interdependencies of different elements, cumulative effects
- Purpose: i) understand the drivers and barriers for new technologies and ii) give policy advice of how to support them [Bergek et al. 2008]
- TIS functions
  major processes in the TIS that affect system performance
  [Bergek et al. 2008, Hekkert et al. 2007]

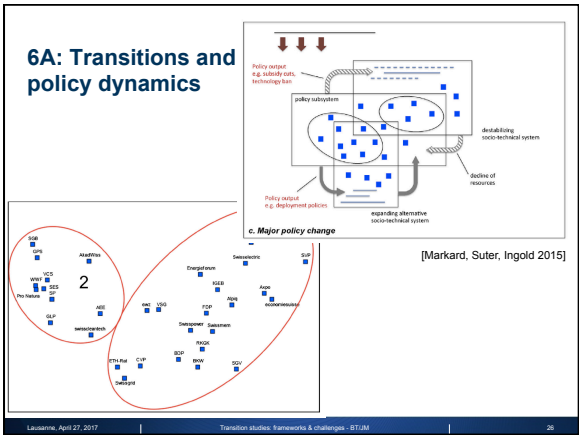


TIS challenges [Markard, Hekkert, Jacobsson 2015]

- Context: What is 'outside' of a TIS? How do TIS and context interact/ overlap? How do context specifics affect TIS development? [Bergek et al. 2015; Markard et al. 2016; Wirth et al. 2013]
- TIS delineation: analytical vs. empirical, iterative process [Coenen 2015]
- Spatial aspects: local and global TIS structures [Binz et al. 2014; Bento & Fontes 2015]
- TIS and transitions: How to use the TIS concept to study transitions? How to analyze TIS-TIS interaction? [Markard & Hoffmann 2016; Sanden & Hillmann 2011]
- TIS and politics: How to analyze conflicts & struggles (e.g. over technology legitimacy)? [Bergek et al. 2008; Binz et al. 2016; Markard et al. 2016]
- TIS and normative issues: Which technologies are desirable/ justify political support?

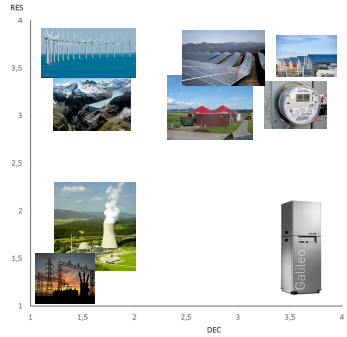
6 Examples of recent conceptual extensions

6A: Transitions and policy dynamics



[Markard, Suter, Ingold 2015]

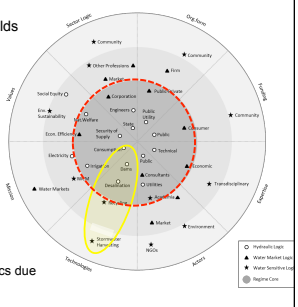
6A: EU energy transition – actor preferences



[Lindberg et al. in prep]

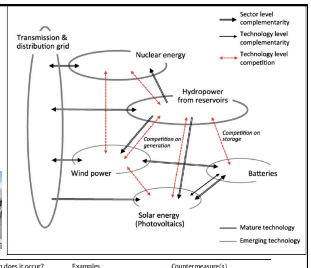
6B: Reconceptualizing regimes: institutional logics & work

- Positioning regimes in organizational fields
  - Segments: institutional dimensions
  - Radiants: degrees of structuration
  - Inner core: Regime(s)
  - Symbols: inst. Logics
- Strengths of regimes
  - Semi-coherence: mixture of symbols
- Niche/Regime relationship
  - Niches can have different positions
- Dynamics
  - Changes in the position of elements/logics due to landscape forces
  - Institutional work (agency)



[Fünfschilling and Truffer 2014]

6C: Complementarities in transitions



Examples of bottlenecks.

Label	Problem description	Type of complementarity	When does it occur?	Examples	Countermeasure(s)
Technology level					
Weak spot	Complementary component does not exist or has low performance	Unilateral, typical for technological complementarities	Often in early stages of technology development	Safe, high capacity tanks for hydrogen vehicles (Tolliefson, 2010)	R&D, innovation, technological breakthrough
Resource limitations	Complementary component is scarce (scarcity can be temporarily or spatially limited)	Unilateral, typical for infrastructure complementarities	Temporary scarcity typically occurs in phases of high growth	Si for PV plants (Section 3.1) Engineers for offshore wind (Section 3.2) Arable land for biofuels Rare earth metals for wind power generators	Monitoring of growth rates, increase of diversity/potential substitutes
Boot-strapping	Each component depends on the other; waiting game	Bilateral, typical for infrastructure complementarities	Typically in early stages of development, critical when upfront investments are high	Gas vehicles and filling stations (Section 3.3) Steel industry and railways (Jastram and Teubal, 1991) Low demand because of low performance No specialized suppliers because of low market volume	Coordinated action, initial investment subsidies

[Markard & Hoffmann 2016]

6D: How to deal with the Geography of transitions?

- Conceptually
  - Institutional embedding
    - Socio-technical embedding
    - Socio-spatial embedding
  - Scale
    - Relational, social constructivist concept of scale
    - A more "global" view on potential transition pathways
  - Power
    - Engage with political ecology and development studies !?
    - A critical view on sustainability discourses and outcomes

Truffer, B., Murphy, J.T., Raven, R. 2015. The geography of sustainability transitions: contours of an emerging research field. Introduction to the Special Section in *Environmental Innovation and Societal Transitions* 17, 63-70.

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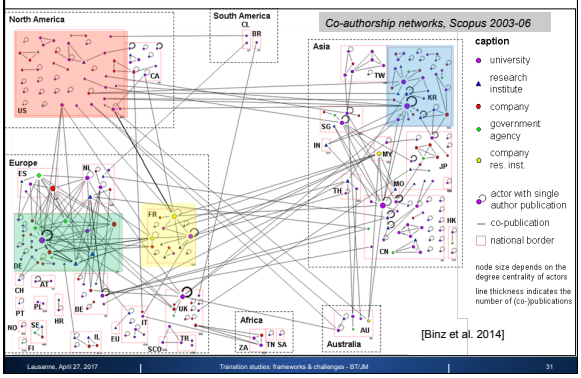
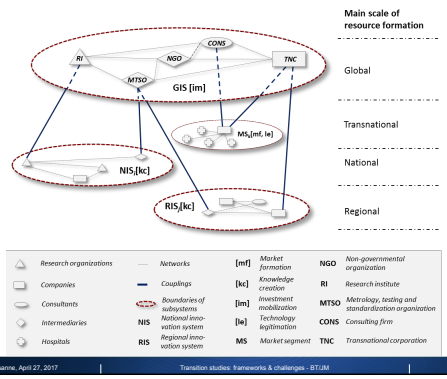
- Setting spatial boundaries in a wrong way



- Global Innovation Systems



7 Wrap up

- Don't despair! There is life after the original writings…
- Transition studies address a very salient and important problem
- They adopt a „systemic" view and conceptualize interdependent processes which are mostly overlooked by more mechanistic approaches
- But: a lot of conceptual and methodological work is still needed
  → bridges to 'classic' disciplines
- This is exciting & good news for young researchers!

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