Introduction to Sustainability Transitions

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NEST Webinar Series
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Outline

1. Grand sustainability challenges
2. Sustainability transitions
3. New research topics around acceleration
4. COVID-19 and climate change

1 Grand sustainability challenges

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Grand sustainability challenges: wicked problems

<table>
<thead>
<tr>
<th>Problem characteristics</th>
<th>Climate change</th>
<th>Flying to the moon</th>
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<tbody>
<tr>
<td>Complex, ill-defined, intertwined, cross-collateralized, recursive, socially constructed, moving target</td>
<td>Clearly defined, scientific and technological problem, shared understanding, stable target</td>
<td></td>
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<tr>
<td>Solutions</td>
<td>Technological and non-technical elements, broad array of potential political, social, economic, and environmental effects</td>
<td>Technical, based on science, engineering, societal, supply-side</td>
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<tr>
<td>Scope</td>
<td>Global, national or cross national, several decades</td>
<td>National, technological, one decade</td>
</tr>
<tr>
<td>Actors &amp; collaboration</td>
<td>Broad range of distributed actors with collaborative (interest), networks and coalitions</td>
<td>State as primary customer, hierarchy, defined roles</td>
</tr>
<tr>
<td>Public, policies</td>
<td>Broad range of policy goals and instruments, policy interactivity (policy mix), and potential conflicts, different levels</td>
<td>Public funding, R&amp;D, national level</td>
</tr>
</tbody>
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2 Sustainability transitions

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Socio-technical transition - example

Development of (core) technology

Development of infrastructure

Central concept: Socio-technical system

Sustainability Transitions

- are socio-technical transitions that are associated with sustainability targets [and ‘guided’ by public policies]

- In other words: Sustainability transitions can be viewed as a response to the grand sustainability challenges discussed above.

- Implicit normative assumption that sectors such as energy, transport, agri-food etc. are unsustainable and have to change e.g. to achieve SDGs

Particularities of sustainability transitions

- 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 in diff. sectors & places

- Multi-dimensional, systemic interaction → e.g. interaction of multiple technologies

Socio-technical transitions

Fundamental, multi-dimensional, long-term changes of socio-technical systems

Geels 2005

STRN community

March 2020: 3'500 papers in total

500 papers/yr

>2'000 members

Impact factor 7.5

>2'000 members

Environmental Innovation 
& Societal Transitions

Research Agenda 
& SI with responses
3 Research topics around acceleration

Different transition phases

- Phase 1: Cleaner technologies, sustainable innovation
- Phase 2: Whole systems, acceleration & decline
  [McMeekin et al. 2019; Rosenbloom, 2018; Turnheim & Geels, 2012]
- Phase 3: System interaction, sector coupling / new lock-ins, dead end pathways
  [Karnøe et al. 2008; Papacharaloupis et al. 2013; Andersen et al. 2020; Rosenbloom 2020]
- Phase 4: Difficult to decarbonize industries such as cement, steel, aviation
  [Davis et al. 2018]

Acceleration & Diversity

- Pay more attention to diversity [Stirling 2011]
  competing technologies/configurations
  e.g. electric vs. fuel cell cars
  individual vs. public transport
  
  - Acceleration: diversity is even more important
    econ. of scale, standardization, new infrastructure, risk of a new lock-in
  
  - Plurality and feasibility of transition pathways;
    associated politics [Stirling 2014; Turnheim & Nykvist 2019]

Sustainability

- How sustainable is the transition? „problem shifting“ [vd Bergh et al. 2015]
- Challenge 1: everything we scale up, creates new problems elsewhere
  e.g. Car batteries (Lithium extraction, e-waste)
- Challenge 2: often, we only concentrate on a single sustainability issue
- Challenge 3: SDGs and trade-offs between sustainability goals

Radical change

- How radical is the transition?
- Which regime rules still intact? How strong is the regime? [Fuentes-Bolding & Truffer 2016]
  EV: speed, acceleration, status, freedom, sport, price, business model
- Disruption by e-mobility? [Gla et al. 2016]
  primarily a threat for supply industries & oil firms
- Transition studies: bias towards technology substitution
  - Solves one problem, creates new ones
  - Not much change required from users
Users, lifestyles
- How important are changes in routines & practices?
  - EVs (or solar PV); no major changes in consumer perspectives [Dijk et al. 2016]
  - transitions are nice, if they don’t disrupt our lives 😊
- But: potential for wider change
  - mass transit, commuting, city planning [Geels 2016]
  - home-office, lifestyles
  - sharing economy / platforms
  - user communities [Meelen et al. 2019]
- Transitions research
  - practice theory, psychology, ...

Unsustainable transitions
- We focus on hopeful developments, but: what about the things getting worse? [e.g. Shove & Walker 2007; Antal et al. 2020]
- Who is pushing / benefiting from these developments?
- Larger trends behind this? … convenience, lifestyle, status and how to break these trends?

Other “transitions out there”
- Our “pet” systems: energy, transport, water, food
- Risk to overlook interaction with major systemic changes out there [Schot & Kanger 2018; Kanger 2020]
  - Technological: AI, digitalization, automation
  - Political: Populism, nationalism, “fake news”, geopolitics [Cetkovic & Hagemann 2020]
  - Economic: Trade wars, increasing inequality, economic crises
- Challenge: dynamics, feedback loops
  - Eg. political systems may change for the worse in times of crisis
  - We can’t just “landscape” these developments
  - Also: Engage with (needed) transitions in economic and political systems
    - e.g. degrowth, new economics, beyond capitalism [Geels, 2019; Kallis et al. 2012; Schor 2014]

We cannot wait & we need a combined response
- Time is running out wrt to climate change [Lund & Byrne 2020; Levin et al. 2012]
  - irreversible damages, tipping points [Lenton 2011]
- COVID-19 recovery programs of unprecedented scale
  - resources will be missing, if we don’t leverage them for climate
- Should be simple, right? BUT
  - We know from past experiences:
    - Policymakers tend to re-stabilize incumbent industries (& jobs)
    - instead of using opportunity for sustainable transformation [Geels 2013]
  - 2008 financial crisis: Germany: premium to buy new cars
  - Millennium drought Australia: large scale desalination [Fuenfschilling & Truffer 2016]

Key challenge: lock-in & vested interests
- Example: five elements that constitute our dependence on cars [Medeiros et al. 2020]
  - auto industry, infrastructure, urban sprawl, public transport, culture
- Lock-in and path-dependence:
  - core of socio-technical regimes / transition theory [Geels 2002; Rip & Kemp 1998]
- Two conditions to initiate transitions
  - I. Disruption (shocks, ext. pressure)
  - II. Alternatives (niche technologies)
I. Harness disruption to accelerate decline

- COVID-19: major disruption, landscape level event
- Use disruptive forces to accelerate decline: coal, oil & gas, conventional cars, fossil heating, inefficient buildings, long-distance flights, commuting ...
- Don’t bail out carbon-intensive businesses; this only delays transformation that is necessary anyway
- Channel recovery to people & regions: retraining, relocation, early retirement, build alternatives ...

II. Promote low-carbon innovation

- Lay foundations for sustainable industries & practices: renewables, e-mobility, public transit, virtual meetings & conferences, sustainable agriculture, meat alternatives ...
- Rethink lifestyles: what do we really need? reduced pace of living, home cooking and baking, working remotely, use bike instead of car, limiting non-essential, non-erotic vacations etc.
- Current changes: transient or lasting?  → support more sustainable practices to last

Wrap up

- We are confronted with grand sustainability challenges
- Sustainability transitions research can provide orientation & policy insights
- As transitions are accelerating, new research challenges emerge
- Disruption by COVID-19 can be leveraged to advance the climate agenda

Thank You!

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