Transformations to Sustainability

Knowledge Briefs

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Frameworks for understanding transformations to sustainability – the 'Multi-Level Perspective' in socio-technical transitions research

Background

In industrialized countries, energy, transport, housing and agro-food systems — which between them deliver essential supplies and services to society — account for 70–80% of the negative environmental impacts of those countries. Such systems can be described as 'socio-technical' since they are comprised of not only technologies, but also social components such as consumer practices, public policies, cultural norms, business models, markets and infrastructures.

Addressing persistent and worsening global environmental problems, such as climate change, biodiversity loss and resource depletion, therefore requires those systems to undergo fundamental change and, in some cases, total transformation.

There are several research approaches geared to understanding how such changes might be brought about. One of these, termed 'socio-technical transitions (STT) research', which emerged in the field of innovation studies, has been widely applied to the analysis of unfolding and future sustainability transitions, such as renewable electricity, urban mobility and agroecology.

One of the core frameworks within the field of STT research is the Multi-Level Perspective (MLP).

Designed to help understand complex transitions that involve multiple actors and activities, the MLP emphasizes the importance of radical innovations, while taking into account the fact that socio-technical transitions involve multiple social groups (such as companies, consumers, social movements, policymakers, researchers, media and investors), who engage in multiple types of activities (such as exploration, learning, debate, negotiation, power struggle, conflict, investment, coalition-building and goal-setting), in the context of the rules and institutions of society and social groups, including their belief systems and norms.

The MLP has been used to analyse both 'green' technologies and social innovations like alternative food networks, bike sharing, telework and community energy. Comparative socio-technical transitions research has used the MLP to explain why the speed and character of unfolding transitions varies between countries; for example, electricity transitions in the UK, Germany and Japan; electric mobility in the UK and Germany; and mobile money systems in Kenya and Nigeria.

Box 1: The Multi-Level Perspective

This Knowledge Brief is based on a peer-reviewed article which synthesizes recent literature on the Multi-Level Perspective (MLP) approach in socio-technical transitions research, including criticisms and recent elaborations.

The MLP is a multi-dimensional, systems-based approach to understanding and analysing large-scale, socio-technical transitions. In taking an integrative approach, the MLP aims to transcend the limitations of traditional, single-track enquiries, which might focus on particular social groups, desired outcomes or academic disciplines.

The systems approach ensures that a wide range of factors affecting the capacity of socio-technical systems to transform are considered. Applying the MLP framework enables the different strands of influence and interaction that affect the evolution of an innovation to be teased out. It reveals the potential of that innovation to change not only the socio-technical system or systems in which it develops, but also the broader context shaping the system itself.

The Multi-Level Perspective in action

The MLP takes as its focal point the evolutionary path of a radical innovation, and considers that path on scale and time dimensions. The main premise of the MLP is that transitions come about through the interplay between processes at different scales or levels of society, over time.

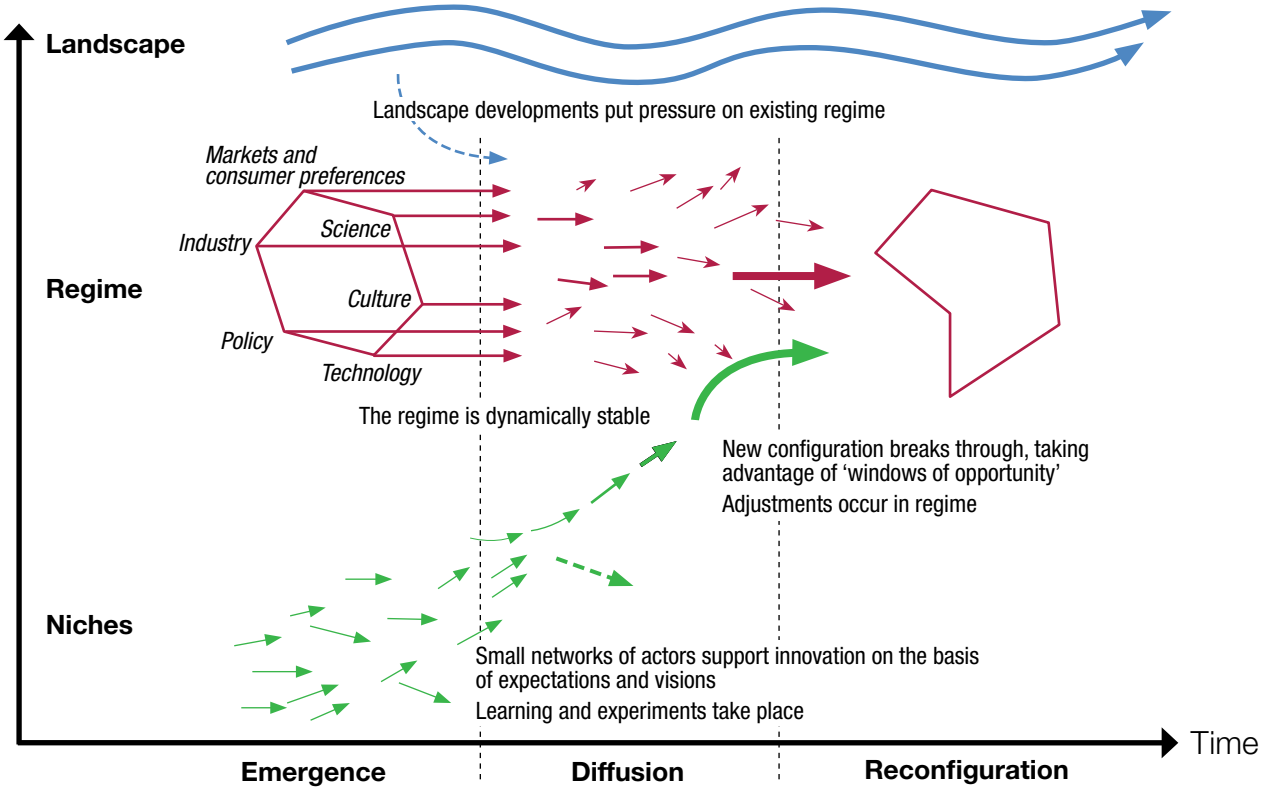
The MLP framework specifies three scales of analysis:

1. The small-scale and local **niche** level in which radical innovations emerge, through the pioneering activities of entrepreneurs, activists or other outsiders. Niches refer to 'protected spaces' that shelter radical innovations from mainstream market selection and nurture learning and development processes.
2. The socio-technical **system** within which those innovations will need to survive; this encompasses existing systems that steer, promote and limit behaviours, such as food networks and transport infrastructure.
3. The socio-technical **landscape**: the wider context in which large-scale developments occur (such as slow-moving changes in demographics, geopolitics and macroeconomics; or abrupt shifts such as those caused by wars or financial crises).

The entrenched shared rules and institutions that shape the perceptions and actions of social groups and stabilize the systems are called 'socio-technical regimes'. Innovation in existing systems and regimes is normally gradual because of various lock-in mechanisms — including social and cognitive lock-in mechanisms that blind people to the possibilities or advantages of change, and institutional lock-in mechanisms such as policy frameworks and vested interests.

The specifics of transitions vary between places, but the general dynamic is that niche-innovations gradually build up internal momentum; the niche-innovations together with landscape changes then create pressure on the system and regime; and the ensuing destabilization of the regime creates windows of opportunity for niche-innovations to diffuse and disrupt the existing system.

Figure 1. The MLP.
The three analytical levels (niche–system–landscape) are represented on the vertical axis and the temporal phases along the horizontal axis, allowing influences and interactions at different levels to be teased out and visualized.



Socio-technical transitions may take several decades and, in the MLP, can be divided into four phases, relating to the life span of an innovation that survives to maturity: experimentation, stabilization, diffusion/disruption, and institutionalization/anchoring.

1. The first phase is characterized by experimentation with radical niche-innovations. This can occur in the context of laboratory research, real-world experiments, or demonstrations, and is characterized by uncertainty, high rates of failure and pioneer burnout.
2. In the second phase, innovations establish a foothold in one or more market niches, which provide a more reliable flow of resources. If supported by wider system trends and activities, the innovation can stabilize into a 'dominant design'.
3. In the third phase, the innovation diffuses into mainstream markets, often involving a struggle between the forces in support of the innovation and the business, economic and political components of the existing regime. There is no guarantee that niche-innovations will win these struggles.
4. In the fourth phase, a new socio-technical system replaces all or some parts of the old one, and becomes institutionalized, for example in regulatory programmes and user habits.

Refining the Multi-Level Perspective

Over the years the MLP has been criticized on a number of counts, including that it gives limited attention to politics, power and cultural meanings; too narrowly focuses on technological innovation; over-emphasizes bottom-up disruption pathways; and inadequately addresses destabilization and decline processes.

Responses to these critiques have resulted in substantive enhancements to the framework, drawing on insights from the wider social sciences, and have spun off in productive research directions. This work is an important and ongoing component of MLP research.

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For example, the MLP has been expanded to incorporate ideas from the field of political economy. These enabled it to identify the strategies for resisting change used by incumbent actors, to describe and account for power relations between (for example) large firms and policymakers, and to view policy change as a shift in the balance of power between groups.

In response to a call for deeper consideration of the role of cultural meanings, ideas from discourse theory (which emphasizes the importance of frames and storylines) have been introduced, allowing the impacts of different frames to be revealed. Framing climate change as a 'market failure', for example, suggests different social and policy responses to those suggested when it is framed in 'planetary boundary' terms.

A criticism accepted by the architects of the MLP, which also applies to the wider field of socio-technical transitions research, suggests that the

approach says less about social sustainability — for example, inequality, poverty and working conditions — than it does about environmental sustainability (and also less about outcomes than about processes). Incorporating emerging research on the social justice consequences of sustainability transitions has the potential to address this.

Transition scholars have also started to investigate the flipside of innovation journeys, namely the destabilization and decline of regimes. An example is the renewable energy innovations that resulted in a decline in the coal industry in parts of the USA. In such situations compensatory measures can be required to counter the resulting resistance to the innovation and ensure a 'just transition'.

Another line of development of the MLP model is the differentiation of distinct transition pathways, which include:

- substitution (when niche-innovations replace the existing regime);
- transformation (in which incumbent actors gradually change existing rules and practices);
- reconfiguration (whereby niche-innovations are incorporated into existing systems and subsequently trigger further change through knock-on effects), and;
- de-alignment and re-alignment (where a major external shock disrupts the existing regime, and multiple niche-innovations emerge, creating prolonged uncertainty until a new regime forms around one of them).

Drawing on governance literatures, early socio-technical transitions research suggested that policy makers should aim to stimulate radical innovation with non-traditional policy instruments, such as real-world experiments and public debate. MLP scholars are, however, starting to investigate the importance of policy mixes that combine classic and market-based instruments with network governance tools. In the process they are shedding light on synergies and mismatches between policies within and across domains of public policy. Finally, transitions research with the MLP suggests that policy makers can actively nurture the emergence of conditions that allow for stronger policies for sustainability, by fostering new coalitions, stimulating public debate, encouraging niche-innovations and constraining inhospitable regimes.

Key messages

- The Multi-Level Perspective (MLP) is an analytical framework that provides a 'big picture,' integrative approach to understanding how transitions come about as co-evolutionary processes. It provides a framework for strategic thinking about long-term, transformative change.
- The MLP has shed light on transitions in energy, transport and food systems, and has explained why some innovations were adopted quickly in some places, but not in others.
- MLP research suggests that policy makers can actively nurture the emergence of conditions that favour stronger policies for sustainability.
- The MLP framework has been, and continues to be, developed and enriched with concepts from a wide range of social science disciplines.

1 Geels, F. W. In press, available online 29 July 2019. Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective. Current Opinion in Environmental Sustainability, https://doi.org/10.1016/j.cosust.2019.06.009.

Written and designed by Green Ink (www.greenink.co.uk)

This Knowledge Brief is one of a series based on recent peer-reviewed research on social transformations to sustainability. The article on which it is based can be accessed free here for more information and citation purposes. The Knowledge Brief has been prepared by the Transformations to Sustainability (T2S) programme secretariat in collaboration with Frank Geels, University of Manchester. The views it expresses do not necessarily represent those of the International Science Council, nor the programme's funders, the Swedish International Development Cooperation Agency (Sida).

The T2S programme understands transformation as a profound and complex socio-ecological process with both short- and long-term implications for the sustainability of natural and social systems. The aim of this series of briefs is to help disseminate knowledge about social transformations to sustainability as widely as possible.

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