TRANSFORMATIVE INNOVATION POLICY & SOCIAL INNOVATION

Transformative Innovation Policy brings together social innovation and technical innovation to address the systemic challenges that most affect us today.

Johan Schot / Alejandra Boni / Matias Ramirez / Carla Alvial-Palavicino

INTRODUCTION

Practitioners of social innovation are familiar with ideas of social change and radical transformation. Yet, such ideas are less common in the world of innovation policy. In the world of policy makers, science and technology and social innovation are often seen as two different domains, the former delegated to economic and higher education policy, and the latter to development and social policy. Transformative Innovation Policy (TIP) is a perspective that brings together these two worlds, the social and the technical, into concepts and practices for transformation. This socio-technical perspective acknowledges that current societal challenges, such as climate change, inequality and migration, are systemic problems that cannot be solved only by technological intervention. Nevertheless, science and technology are crucial for system transformation as they provide an imaginary for a future and a repertoire of possibilities.

> **Science and technology are crucial for system transformation as they provide an imaginary for a future and a repertoire of possibilities.**

This understanding implies that a change is required in the way we conceptualize and conduct science, technology and innovation (STI) policy, beyond simple notions of economic growth or the pursuit of pure science. The endeavor of Transformative Innovation Policy is to provide such a framework, starting from the acknowledgement that in the context of complex problems, such as those embodied in the Sustainable Development Goals (SDGs), there are no miracle one-fits-all solutions. Such a framework builds on the possibility of alternative futures, the non-neutral nature of technology, the transformative potential of citizen movements, firms, governments and knowledge organizations, co-construction and the needs, dreams and desires of users and non-users.

THE THREE FRAMES OF INNOVATION POLICY

Science, technology and innovation (STI) has played a central role in the development of the world as we know it today. Especially after WWII, STI policy became a concern for governments as a driver of growth, development and wellbeing. Yet, as we know today, technology and innovation have also become a part of the problem. To understand how STI policy can contribute to transformation, we need to understand the logics behind it.

We distinguish three frames of STI policy [1, 2]. Frame 1 or 'Innovation for Growth' emerged in the post-war period, stressing the benefits of science and technological change to the economy. In an epoch in which the massification of new technologies, such as the car, television, washing machine and passenger airlines, brought enormous changes to the lives of ordinary people in the West, policy makers became concerned about the role of the public sector in supporting these life-changing inventions. These innovations, which in the language of economists constitute a public good, suffered from 'market failures', that is, the inadequacy of the market to support their development at the level and quantities desired, hence requiring state intervention. This frame, also known as the linear model of innovation, reflects a time of rapid economic growth and technological development, a modernist belief in the inevitability of progress, and the notion that unintended consequences such as pollution can be dealt with by means of more science and technological development and regulation.

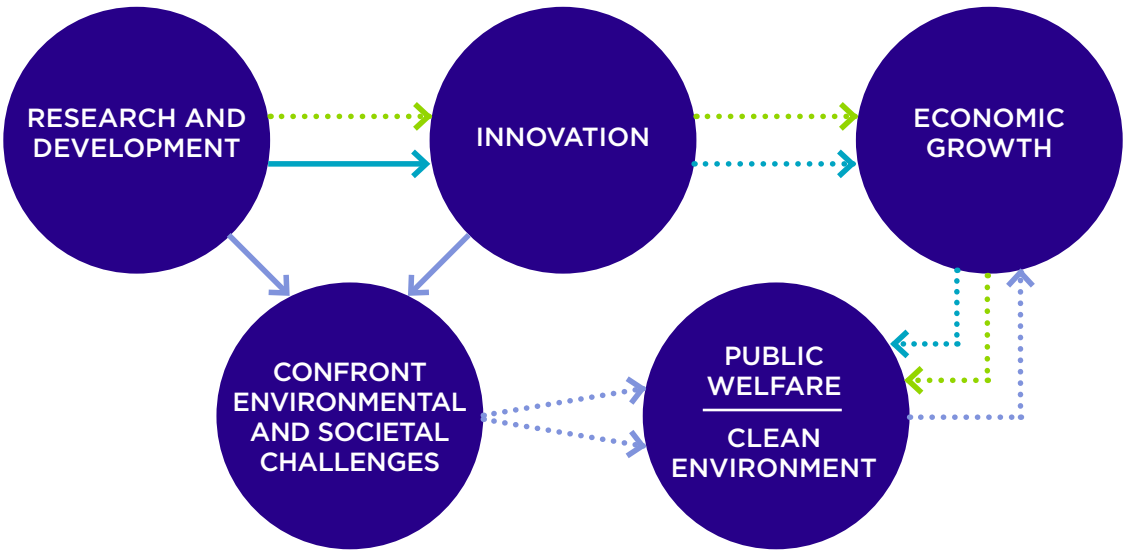
Frame 2, or 'National Systems of Innovation', emerged in a context of growing international competition, marked by economic shocks such as the 1970s oil crisis. Analysts started to recognize that knowledge transfer was difficult, and there were tacit and organizational components not accounted for before. Following the emergence of Japan and Korea into knowledge economies, this new frame brought attention to the different paths that countries and regions followed in the constitution of innovation systems, characterized by systems and institutions that support learning, capacity building and entrepreneurship. This frame led a move from a linear view of innovation to a more systemic one.

Frame 3 is what we call 'Transformative Innovation Policy'. For more than a decade the question of how to align STI policies with existing societal and global challenges has been discussed. This frame takes environmental and social challenges as the central component of STI policy, questioning assumptions about the neutrality of technological innovation. It starts from the question, what needs to be transformed in order to achieve these challenges? We argue that the socio-technical systems that fulfill basic needs, such as energy, mobility, food, water and communications, need to have a fundamental shift in order to become truly sustainable. This is different from what constitutes a mere system optimization, e.g. improvements in agricultural yields. Changes that are needed involve infrastructures, such as food supply systems, and cultural norms and practices, such as what we consider a healthy diet. Hence, this frame brings the attention to the direction of innovation, namely the different social and political choices embedded in technological choices.

These three frames co-exist in STI policies, and each of them fulfills an important role. Yet, more emphasis on frame 3 is required for innovation to play a prominent role in finding solutions to global challenges.

TRANSFORMATIVE INNOVATION IS ABOUT SYSTEMS CHANGE

As social innovation is concerned with social change, transformative innovation policy integrates the concern for social change into a transformative perspective. It focuses on transformation of what is called socio-technical systems in the sustainability transitions literature. These are complex systems composed of aligned technologies, knowledge, infrastructure, markets, governance and regulation, culture, and industry structures that interact, mutually re-enforce



Solid line = This shows the frame addresses explicitly this aspect
(e.g. the link between knowledge creation and utilization in frame 2).
Dotted line = This indicates that an aspect is assumed to follow automatically
(e.g the utilization of the results of basic scientific research by industries in frame 1).

each other and co-evolve (see the infographic for the energy system, but similar ones could be made for food, mobility, healthcare, water etc.). The OECD has recognized the importance of systems innovation for societal challenges, defining it as "a radical innovation in socio-technical systems which fulfil societal functions, entailing changes in both the components and the architecture of the systems" [3, p. 15].

> **As social innovation is concerned with social change, transformative innovation policy integrates the concern for social change into a transformative perspective.**

The literature on sustainability transitions, and in particular the multi-level perspective (MLP), provides a framework to understand how changes in socio-technical systems occur. It distinguishes three levels: niche, regime and landscape. Change emerges in spaces called niches, protected spaces for the emergence of new socio-technical systems without direct pressures from the dominant regimes. The dominant regime refers to a set of rules which drive socio-technical system change in a particular directionality, for example more centralized production. Niches often nurture a different set of emerging rules than the ones of the dominant regimes. Yet, as these are in constant fluctuation, they require some protection as the niche builds and stabilizes. The landscape refers to the exogenous environment shaping both niches and regimes, with pressures such as globalization, climate change, wars, natural disasters, and economic crises. Transitions in a socio-technical system are the result of interaction of events on all three levels [4].

The socio-technical energy system

Systemic change cannot be addressed with the same policies and instruments already in play; changes in the organizational and institutional contexts of science policy are therefore required. TIP proposes some directions for these changes.

TRANSFORMATIVE INNOVATION IS ABOUT EXPERIMENTATION, LEARNING AND INCLUSION

Frame 3 starts by acknowledging that there are no best and optimal approaches to complex problems. Therefore, it focuses on experimentation, a structured learning process informed by evidence and experience to explore potential paths and their consequences. An experiment is a series of practices, methods and objectives used to inform and facilitate processes of learning and changes in policies. It allows to test ideas at small scale and in real contexts before full implementation, without the compromises of large-scale policy intervention. Experiments can be instruments (initiatives, programs, policies, etc.) that support aspects of TIP, such as changes in learning and reflexivity, changes in expectations and the way people think about the future, and changes in the networks of actors that participate in an experiment. An example of such an experiment are the mechanisms to support the development of grassroots community energy initiatives in the search of sustainable and scalable business models [5].

These experiments require evaluations that differ from traditional evaluations of public policies. These evaluations should seek to assess the level and process of learning, if niches with transformative potential have emerged and evolved, and the type and degree of change generated by an intervention. Each evaluation develops a specific Theory of Change (ToC) for the experiment, based on an MLP perspective.

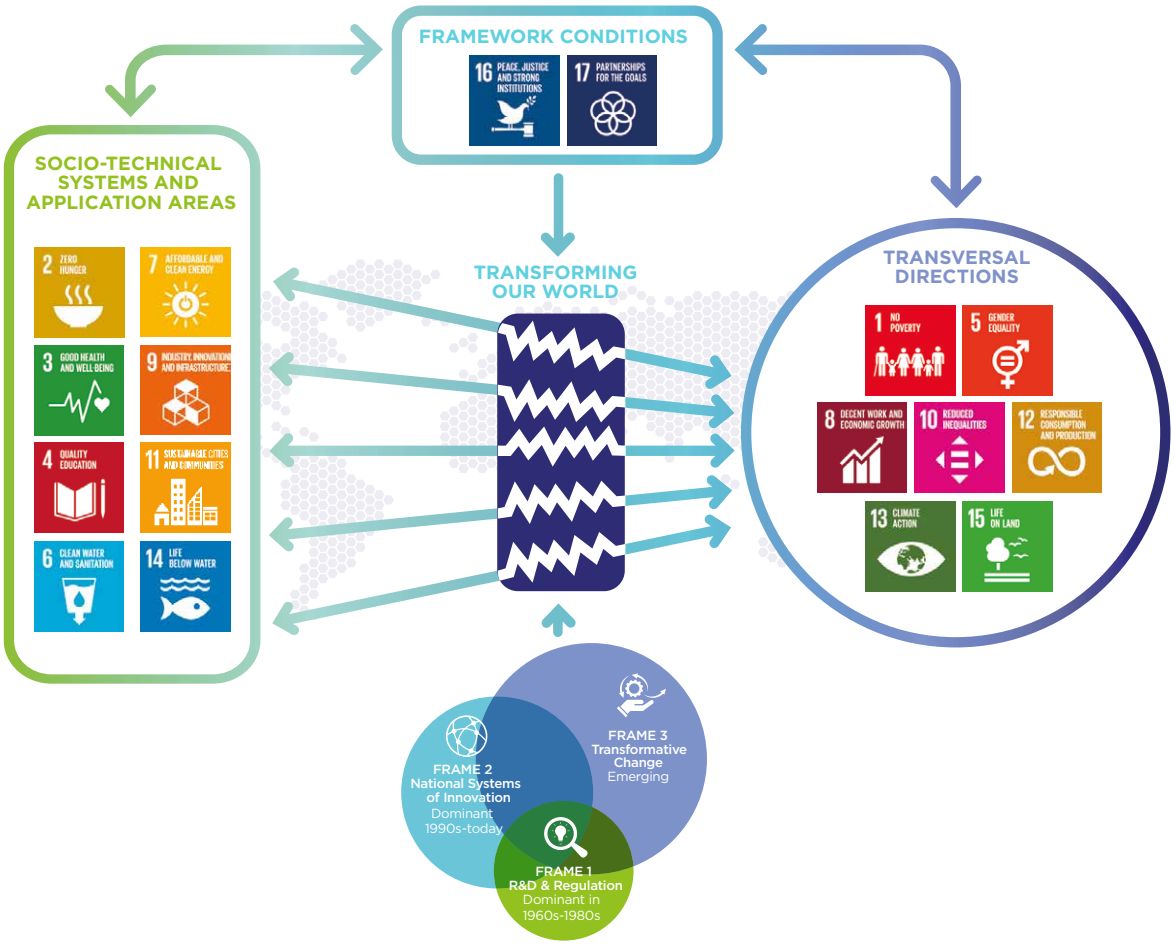
We propose six elements that help identify a policy with transformative potential. We will use the example of the socio-technical system of energy provision to illustrate these dimensions.

1. Directionality: the collective process of understanding and engaging with the multiple potential paths of development and enabling a process of critical appraisal and learning. For example, large-scale and centralized versus small-scale, distributed energy sources provide different alternatives regarding efficiency, resilience, empowerment and participation, which are not comparable under a single optimization.

2. Societal Goal: the focus of the policy is in goals such as the SDGs or grand challenges. In this case, the societal challenge is to provide reliable and affordable energy in a way that is environmentally and socially sustainable.
3. Systems-level impact: addressing changes at the socio-technical level. A systems level perspective on energy does not only look at supply, but asks questions about how and for what we use energy, what social practices are associated to its use, and how we can do it differently.
4. Learning and reflexivity: promoting second order or 'deep learning', that is, learning about the mindset and assumptions embedded in dominant practices. Learning, for example, about the assumptions of efficiency and optimization embedded in our energy systems, about our notions of comfort, that shape the way we use and plan energy systems.
5. Conflict and consensus: different views about what is at stake in systems transformation can lead to conflict. TIP should acknowledge this conflict and include it as part of the process. Many communities might disagree with the development of hydropower or large solar infrastructures in the name of clean energy. These views should be taken into account.
6. Inclusiveness: including all relevant actors, such as civil society, users and marginalized communities. In the same line, discussion should not be limited only to experts, but also acknowledge that users have enormous agency in how we use energy efficiently, as well as workers and local communities.

AGENDA 2030 AND THE OPPORTUNITY FOR TRANSFORMATIVE INNOVATION POLICY

Global challenges as represented by the SDGs are a unique opportunity for systems transformation, bringing together social and technical innovation. Agenda 2030 is an urgent, inclusive and value-creating direction towards sustainability that calls for both research efforts and new policy approaches. Sustainability cannot be achieved by merely optimizing existing systems, and it should take into account the interactions and trade-offs between different objectives. The SDGs should not be considered a 'checklist', but instead should be seen as a systemic understanding of well-being, consisting of economic, social and ecological dimensions. In other words, to address the SDGs, policies should de-



centralize them, and instead focus on the underlying transformation processes which will, if they unfold in the desired way, address the SDGs. This focus on transformation is in fact responding to the strapline of the UN Agenda 2030: Transforming our World.

To enact transformation, STI can play a key role. However, this is only possible when STI is seen as a key factor in realizing all 17 SDGs, rather than being isolated in SDG 9 industry, innovation and infrastructure (as is currently the case). True, to play this role STI policy needs to become more focused on transforming socio-technical systems towards new directionalities (and thus should take frame 3 as its main rationale). From this perspective and to implement transformative innovation policy SDGs could be grouped in three different types: (i) SDGs about socio-technical systems, such as clean energy (SDG 7) or health (SDG3), (ii) SDGs that emphasize directionality, such as SDG 10 on reduced inequalities and SDG 8 on decent work and (iii) SDGs that focus on governance, e.g. structural transformations in the state, market, civil society and our knowledge system, such as SDG 16 on peace, justice and strong institutions and SDG 17 on partnerships for the SDGs. Transformative innovation policy should then be focused on using one set of directionality-related SDGs to transform socio-technical systems related SDGs through experimental approaches which require addressing the governance related SDGs.

Transformative innovation policy provides a framework that brings together the insights of social innovation and STI policy to address challenges such as the SDGs in a more fundamental way. As an emergent approach, there is an enormous opportunity for learning and cooperation between researchers and practitioners in these fields.

REFERENCES

[1] Schot, J. W./ Steinmueller, W. E. (2018): Three frames for innovation policy: R&D, systems of innovation and transformative change. In: Research Policy, 47 (9), pp. 1554–1567.

[2] Weber, K. M./ Rohracher, H. (2012): Legitimizing research, technology and innovation policies for transformative change: Combining insights from innovation systems and multi-level perspective in a comprehensive 'failures' framework. In: Research Policy, 41 (6), pp. 1037-1047.

[3] Organisation for Economic Co-operation and Development (2015): Systems Innovation: synthesis report. Internet: https://www.innovationpolicyplatform.org/sites/default/files/general/SYSTEMINNOVATION_FINALREPORT_0.pdf. [Last accessed 23.06.2019]

[4] F. Geels, F./ Schot, J. (2007): Typology of Sociotechnical Transition Pathways. In: Research Policy, 36 (3), pp. 399-417

[5] Smith, A./ Raven, R. (2012): "What is protective space? Reconsidering niches in transitions to sustainability. In: Research Policy, 41 (6), pp. 1025-1036.