TRANSFORMATIVE INNOVATION POLICY CONSORTIUM

INNOVATION FOR TRANSFORMATION
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“The long-term vision of TIPC is to lead experimentation in science, technology and innovation policy for transformation. Accompanied by rigorous comparative empirical research, we aim to build a constituency behind transformative policies through experimentation, evaluation, training and capability building and public outreach. We are looking to generate new frameworks, standards, narratives and demonstrators which allow for positive upscaling. We would like to see widespread adoption of new transformative practices in the Global South and North. Every country in the world has the challenge of achieving social and economic advancement that is sustainable. It is the issue of our time. TIPC explores novel ways of mutual policy learning and co-creation of knowledge between research and policy to meet this goal.”

Professor Johan Schot,
Director, Transformative Innovation Policy Consortium
Professor of History of Technology and Sustainability Transitions
INTRODUCTION TO TIPC

The Transformative Innovation Policy Consortium (TIPC) is a trans-national group of academic researchers, policy makers and innovation funding agencies working together to give substance to a new framing for Science, Technology and Innovation (STI) policy that aims to contribute to addressing global societal challenges, as encapsulated in the United Nations’ Sustainable Development Goals (SDG’s). This new framing is known as Transformative Innovation Policy (TIP).

Co-ordinated by the Science Policy Research Unit (SPRU) at the University of Sussex Business School in the UK, the current members comprise of ministries and agencies from Colombia, Finland, Mexico, Norway, South Africa and Sweden. There are also associated TIP initiatives in Brazil, China and Panama. A new initiative, funded by the International Development Research Centre (IDRC), will eventually see three additional sub-saharan African countries taking part in pilot TIP work.

Working together in a co-created five-year programme that mobilises empirical research, and combines it with policy experimentation; evaluation; training and capacity building; and communications, TIPC is building constituencies behind Transformative Innovation Policies (TIPs) to allow up-scaling. This transdisciplinary approach is already generating new frameworks, standards, demonstrators and narratives. TIPC is allowing exploration of novel ways to harness mutual policy learning between countries in the Global South and North.

Formulating the key areas of enquiry for TIP has been significant. Establishing the beginnings of the research agenda and the questions for analysis, experimentation, implementation and evaluation was the primary impact of TIPC’s pilot year. This has now been taken forward into an exciting, challenging and dynamic five-year programme.
TIPC has produced a number of research briefs, working papers and other materials. Along with the Three Frames of Innovation position paper, these can be accessed at www.tipconsortium.net

**RESEARCH BRIEFS**

- Developing a Shared Understanding of Transformative Innovation Policy
  JOHAN SCHOT, CHUX DANIELS, JONAS TORRENS (TIPC RESEARCH BRIEF 2017-01)

- The Roles of Experimentation in Transformative Innovation Policy
  JONAS TORRENS, JOHAN SCHOT (TIPC RESEARCH BRIEF 2017-02)

- Addressing The Sustainable Development Goals Through Transformative Innovation Policy
  JOHAN SCHOT, ALEJANDRA BONI, MATIAS RAMIREZ, FRED STEWARD (TIPC RESEARCH BRIEF 2018-01)

**POSITION PAPERS**

- Three Frames for Innovation Policy: R&D, Systems of innovation and Transformative Change
  JOHAN SCHOT, ED STEINMUELLER (RESEARCH POLICY, AUGUST 2018)

A series of TIPC Working Papers can also be found at www.tipconsortium.net/publications-and-library/

For new releases, register for the TIPC Digital Digests at the website and follow on Twitter at @TIPConsortium
The TIPC Five Year Programme includes seven trans-national partners, with the Science Policy Research Unit (SPRU) as co-ordinating partner.
WHY THE NEED FOR A TRANSFORMATIVE INNOVATION POLICY CONSORTIUM?

A WORLD IN TRANSITION

SUSTAINABLE DEVELOPMENT GOALS

WHY IN SO MUCH FLUX? A Diagnosis
We are in the Second Deep Transition. The First Deep Transition was the move toward Industrial Modernity, it lasted 150 years. Deep Transitions transform socio-technical systems that are the backbone of our civilisation. Current systems are based on fossil fuels, mass production, mass consumption, resource and waste intensity. They cannot address the Sustainable Development Goals or ride the waves of the current megatrends. While the future is open, the world is moving in many directions simultaneously, radical innovation at systemic level is necessary.

POLICY EXPERIMENTATION, TRANSFORMATIVE RESEARCH, AND COMPETENCE BUILDING

WHAT TO DO? The Prescription
Innovation was “Creative Destruction” now it has become more “Destructive Creation”. Science, Technology and Innovation Policy needs a fresh model – Transformative Innovation Policy. An evolving edge approach to creating inclusive and sustainable socio-technical systems that could meet the SDGs. Current policies are based on Frames 1 and 2 of innovation. TIP is Frame 3 thinking.

CREATION OF A 5 YEAR PROGRAMME TO DEVELOP TRANSFORMATIVE INNOVATION POLICY

STRATEGIC INTERNATIONAL PARTNERSHIP
Members
Swedish Governmental Agency for Innovation Systems – VINNOVA
Colombian Administrative Department of Science, Technology & Innovation – Colciencias
The South African National Research Foundation – B∐
National Science and Technology Council of Mexico – CONACYT
Science Policy Research Unit, University of Sussex
Research Council of Norway

Associates
Chinese Academy for Science and Technology for Development – CASTED
National Science and Technology Council of Panama – SENACYT

GLOBAL ISSUES, GLOBAL CONSORTIUM
Joint Program of research, learning, networking to articulate Transformative Innovation Policy agenda to define 5 year experimental program with flagship projects, research network and program, training and shared learning activities.
THE THREE FRAMES OF INNOVATION

Re-thinking innovation policy is timely. Many research councils, governments and international organisations want innovation to address a number of societal or grand challenges. Another indicator is the growing impact of the notion of Responsible Research and Innovation (RRI). Yet how to design, implement and govern challenge-led innovation policies is far from clear. Many innovation policies are based on the 20th century supply-driven innovation model, which takes competition between nations and support for R&D as the main entry point for policy making without thinking more creatively about the broader suite of innovation policies that are available. Over the last decades two main innovation policy frames have been developed.

THE FIRST FRAME OF INNOVATION: R&D AND REGULATION

The first framing portrayed innovation policy as providing incentives for the market to produce socially and economically desired levels of science knowledge (R&D). This is mainly implemented by subsidies and measures to enhance the ‘appropriability’ of innovation (IPR). To identify which areas need support, foresight has been developed. With respect to negative externalities, various forms of technology assessment have been established and, to protect society if the impacts are becoming a problem, regulation is put in place. This framing identifies the most important element of innovation as the discovery process (invention) and gives rise to the linear model in which technology is the application of scientific knowledge. The linear model privileges discovery over application. In part because the rewards of application are assumed to be carried out through an adequate functioning of the market system. Only in the case of market failure, is government action required.

THE SECOND FRAME OF INNOVATION: NATIONAL SYSTEMS OF INNOVATION & ENTREPRENEURSHIP

The second framing aims to make better use of knowledge production, supports commercialisation and bridges the gap between discovery and application. This framing takes as central various forms of learning including: those acquired by using, producing and interacting; linkages between various actors; absorptive capacity and capability formation of firms; and finally, entrepreneurship. The rationale for policy intervention is system failure – the inability to make the most out of what is available due to missing or malfunctioning links in the innovation system. Innovation policy focuses, for example, on technology transfer, building technology platforms and technology clusters to stimulate interaction and human capital formation. Further, in this model, foresight, technology assessment and regulation are add-ons to the core activity of promoting innovation (on the assumption that any innovation is desirable and good since innovation is the motor for producing economic growth and competitiveness).
TRANSFORMATIVE INNOVATION POLICY CONSORTIUM: INNOVATION FOR TRANSFORMATION

THE THIRD FRAME OF INNOVATION: TRANSFORMATIVE INNOVATION POLICY

A third frame for innovation policy is that of transformative change which takes as a starting point that negative impacts or externalities of innovation can overtake positive contributions. This frame focuses on mobilising the power of innovation to address a wide range of societal challenges including inequality, unemployment and climate change. It emphasises policies for directing socio-technical systems into socially desirable directions and embeds processes of change in society.

Transformative Innovation Policy (TIP) explores issues around socio-technical system change to give a structural transformation in: governance arrangements between the state, the market, civil society and science; experimentation and societal learning; responsible research and innovation; and, finally, a more constructive role for foresight to shape innovation processes from the outset and on a continuing basis.

HOW DOES FRAME THREE DIFFER?

This flowchart below demonstrates the principal difference between Frames 1 and 2, and then that of Frame 3.

Frames 1 and 2 assume public welfare will be addressed through the stimulus of new knowledge and innovation which will be utilised by industry to achieve economic growth. Frame 3 explicitly and fundamentally addresses societal goals as a primary focus. By tackling societal challenges first and foremost, Frame 3 thinking supposes that, with attention on social and environmental welfare, there will be greater productivity and less inequality, therefore then, increased economic growth. It flows counter to that of Frame 1 and 2 assumptions.

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**Flowchart:**

- **Frame 1**
  - Research and Development
  - Innovation
  - Confront Environmental and Societal Challenges
  - Public Welfare
  - Clean Environment
  - Economic Growth

- **Frame 2**
  - Add dotted lines indicating automatic follow-up processes.

- **Frame 3**
  - Solid lines with arrows indicating explicit addressing.

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**Legend:**

- 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).
AIMS OF THE TIPC PROGRAMME

- To broaden the concept of innovation. A TIP approach encompasses experimentation with robust transformative evaluation techniques that support a re-make of systems with the development of new services and organisational models to meet social, environmental and economic challenges. This involves a wide range of actors – from innovation researchers, government agencies and funders, to firms, to knowledge institutions, to users, to NGOs and to wider society.

- To provide direction to innovation. This outcome is not about setting priorities, but about improving the process of opening up to a possibility of choices, and then, of the closing down of options. Transformative Innovation Policy (TIP) should allow a greater diversity of options without falling back to dichotomous, ‘for’ or ‘against’, arguments around specific options. It should specifically enable experimentation with options outside the narrow boundaries set by incumbent practices.

- It should be based on scientific advice from a broad range of perspectives, and should nurture opportunities for various stakeholders to challenge the dominant views. TIP inescapably and necessarily involves conflict and political power struggles. Governance structures should be made compatible with these aims.

- TIPC does not assume that innovations and transformative change policy and practice will necessarily come from the Global North with other countries playing ‘catch-up’. On the contrary the assumption is that both the Global South and Global North contribute, and that mutual learning will be beneficial.

THE FIVE YEAR PROGRAMME

TIPC members are co-creating new knowledge and practice to deliver transformative Science, Technology and Innovation policy through a new research agenda that combines experimentation, evaluation, training and capability building, for mutual learning to inform the narrative and discourse around TIP.
The rationale is that the TIPC core programme is co-created and participatory. The core elements interplay with specific implementation projects in each member country. The nucleus of work on transformative innovation and change at the centre informs the country-context initiatives. In turn, these bilateral projects then feedback into the shared knowledge and experience at the centre. By interlinking the aims, knowledge and findings on STI in achieving, for example, the aims of the SDGs, the transformative STI movement strengthens and grows to enable and activate more rapid, fundamental change.

The co-creation principle is key to this work and all participants are positioned as active co-researchers and co-policy designers. A fundamental aim of the five-year programme is to find alternative approaches to meeting the aims encapsulated in the Sustainable Development Goals and Agenda 2030.

**IMPACT**

- **Demonstrators** – Activities will be backed up with rigorous data-collection and evaluation so it is thorough, evidence based policy-making.

- **People** – Training, competence building, mentoring, coaching and co-creation.

- **Rejuvenated Standards** – New frameworks and narratives along with national and international data infrastructures.
INNOVATION FOR TRANSFORMATION: POLICY ACTIVITIES

- Building transition arenas to support diversity and the opening up of alternatives with pathways to sustainability
- Technology forcing through regulation and/or procurement
- Building on social innovation, inclusive innovation, frugal innovation, pro-poor innovation
- Setting-up large scale societal experiments and scaling-up with use or creation of intermediaries, harnessing Strategic Niche Management
- Enhancing anticipation, adaptability, reflexivity capabilities
- Constructive Technology Assessment and Responsible Research & Innovation
- Bridging Science/Engineering and Social Sciences/Humanities in the education system
- New institutions for coordination between various policies with integration and policy mix of STI into other policies - energy, housing, agriculture, healthcare, transport, and city policies
During the pilot year, TIPC members co-created criteria of six elements which constitute steps towards achieving Transformative Innovation Policy. In the Transformative Innovation Learning History (TILH), conducted for each country’s exploratory phase, the extent to which these criteria were present was analysed and explored. The criteria informs Transformative Innovation Policy practices.

**A TRANSFORMATIVE INNOVATION POLICY APPROACH**

**DIRECTIONALITY:**
Did the policy suppose non-neutrality or were a wide range of technological options considered and did it address which social and environmental issues they would provoke? Did the project and policy consider the non-neutrality of technology?

**SOCIETAL GOAL:**
Did the initiative focus on grand societal challenges such as those encompassed in the United Nations’ Sustainable Development Goals?

**SYSTEM-LEVEL IMPACT:**
Does the initiative address change on the level of socio-technical systems? Does it have wide impact?

**LEARNING AND REFLEXIVITY:**
Does the project allow for ‘second order’ or ‘deep’ learning? Is the opportunity for this embedded within the policy and project?

**CONFLICT VS CONSENSUS:**
Were differences in opinion between stakeholders acknowledged and encouraged?

**INCLUSIVENESS:**
Have civil society actors and/or end-users been included?
From the outline, it follows that a Transformative Innovation Policy (TIP) needs to engage with 'Directionality' – the first of the criterion. The question here is whether in policy formulation and stakeholder engagement there is recognition that there are alternative pathways or trajectories by which technology can develop. The risk of not engaging with directionality is that existing trajectories may simply be replicated or extended.

The case study selection criterion of 'Societal Goal' represents the extent to which a policy initiative can be said to be directed at one or more specific social challenge. Identifying the challenge or challenges is important to locate the case study for comparative purposes. It also provides a basis for exploring how different actors understand the nature of the challenge and the means for meeting it. These understandings are a basis for diverse viewpoints – and capturing this diversity is an important part of the case study research. It is a principal reason why we have adopted the methodology of Transformative Innovation Learning Histories (TILH).

The criterion of 'System Level Impact' is an indication of whether the innovation is aimed at a transformation of underlying routines. Impact can be considered as the extent or scale of expected change. As noted in the above working definition, one indication of transformative is the extent of the disruption or break with past routines and practices. As always, there is a risk that novelty in language is a substitute for more fundamental change. By considering how routines and practices will be altered, the scale of system level impact can be judged in comparison with other efforts to enact change or reform.

The degree of 'Learning and Reflexivity' is a further indication of the transformative nature of the policy initiative. These are further indications of the ways in which routines and practices are altered by the innovation policy. Here, the focus is one of the accumulation of knowledge about the new routines and practices that emerge as new directions are explored. What is learned? Who learns? Do processes of learning involve questioning of existing routines, and understanding each other’s assumptions and worldviews? Are these current and future learnings shared or exchanged with others? How are they preserved and applied over time?

The last two criteria – ‘Conflict vs Consensus’ and ‘Inclusiveness’ – relate to the social aspects and politics of the initiative – addressing issues of democratisation, interests and inclusiveness. The issue of 'conflict' is about the recognition of interests. Some of these interests may support while others may oppose the transformative nature of policy (transformative in either sense). Conflict is expected although it is expressed in different societies in different ways. In some cases, it is made explicit, in others there is a search for common ground that allows widespread consent. There is no 'best way' for managing conflict, but considering how it is manifested and resolved is an important question for the case study research. The issue of inclusiveness recurs at several different levels in the policy cycle (the planning, implementation, and evaluation of policy). Inclusiveness refers both to the breadth of participation and empowerment and also its depth – the extent to which included actors are able to influence the processes of the policy cycle.
EXPLORATORY PHASE

Prior to joining the five year programme each potential member embarks on an exploratory phase to understand and analyse how the three framings of innovation interact and to examine prospects for Transformative Innovation Policy (TIP) elements within their national context. Following this they can be considered to join the full programme.

Overview of policy activities from the perspective of the 3 frames of innovation Co-created study of national STI policies and potential for TIP.

Review shared learnings with other potential and established members to promote deep learning and analysis. Shortlisting and selection of the case study for each country’s Transformative Innovation Learning History (TILH).

Conduct in-country TILH with workshops and evaluations. Analysis of case study, preparation of final report and discussions on next stage.

Further analysis, learning and coproduction of knowledge between other potential and established members. Participation in TIPC Conference.

If appropriate become a full member of the TIPC Five Year core programme.
TIPC GLOSSARY OF TERMS

In TIPC, the overall aim is the co-creation of knowledge about TIP. However, participants have different prior understandings and experience which has required the construction of a shared vocabulary.

The meanings and contextualisation of this vocabulary will differ across participants. It is not productive either to dictate1 this vocabulary or to pursue a ‘grounded approach’ that begins without pre-conceptualisations. Instead, we need to begin with a set of starting points for discussion about key terms and concepts and then discuss how these are understood, translated, and applied in thinking about and gathering evidence concerning member case studies. This glossary2 offers a set of starting points shaped by a position on: academic pre-conceptions, the initial accounts of practice offered by partners and reflections on the case studies that have been offered by the partners. To simplify, the notes below make declarative statements rather than qualified and tentative statements such as ‘some scholars or practitioners understand <vocabulary term> to mean <definition>. Since this glossary is a tool in the research process, we do not reference the terms here. In TIPC publications, we will provide more detailed references.

These terms relate to the rationale for TIPC and the glossary demonstrates terms that have received attention in TIPC discussions and analysis.

ACTORS
The proponents of and opponents to transformative change that respectively seek to accomplish or seek to block, divert, or slow transformative change for a variety of reasons including a perception or the reality that such change will disadvantage their current interests. Actors can be individuals, groups of individuals working within organisations and across organisational boundaries (so networks or coalitions) and organisations.

ACTOR-MAP
Overview of proponents and opponents as well as included and excluded actors and how they relate to each other and interact with each other. The actor-map would include attention to power-dynamics between actors (their dependencies, struggles, conflicts, divergent rationales and values).

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1 The word ‘dictate’ suggests that there is an authoritative definition of vocabulary or that, for the purposes of the consortium, we defer to some authority (e.g. for purposes of expediency). Since we regard transformative innovation policy itself to be innovative, there is no prior authoritative definition. Our collective desire to engage in co-production means that it is inappropriate to defer to either an external or internal authority.

2 Version 1: Ed Steinmueller, Johan Schot, April 10 2017
CO-CREATION
A process in which participants attempt to reach a common understanding based upon reasoned discussion with attention to the opportunities and barriers for conveying this understanding to others. The aim is not consensus, but a better understanding of points of differences and overlap. Other words used sometimes are co-production, and co-construction. In our research process these words have a similar meaning.

DEMOCRATISATION
In our project refers to participation. It is expected that achieving transformative change may require participation by many actors and drawing on their innovative potential. Participation also means that many actors have a voice and the least powerful are in the position to challenge the most powerful actors.

DIRECTIONALITY
Based upon one of the stylised facts of innovation research we can say that innovation is cumulative (building upon the past), innovation can be said to have a direction. Only certain solutions are looked for while others are typically ignored. This direction (sometimes called a trajectory or pathway) can be altered by transformative innovation that establishes a new direction and thus process of accumulation (also a new trajectory or pathway). A corollary is that a change in directionality involves the abandonment or destruction of an older direction (trajectory or pathway) (although it may involve the old pathway becoming much less prominent and influential). The process of change can follow a range of patterns. Two major ones: 1) substitution so competition between directions and in the end full or almost full replacement; 2) hybridisation (or reconfiguration) where several directions are combined, so elements of the old regime persist.

INCLUSIVENESS
Closely coupled with democratisation, this refers to the inclusion of all actors in decision making processes, but goes beyond that since it also refers to actors having the access and capabilities to participate. So it includes a consideration of the context in which actors interact.

Consideration of interests, democratisation, and inclusiveness is linked to the politics of innovation policy and therefore to issues of legitimacy (the extent to which innovation policies are seen as legitimate roles for state actors) and accountability (how the outcomes of policies are assessed).

INNOVATION
An idea, or process whose novelty distinguishes it from prior ideas and processes and is taken up and utilised (including processes of articulation, adaptation, or customisation) by people other than the originator(s). The idea of process can be a re-invention or re-use of older ideas and processes. Innovation is basically a process of renewal. Please note that for us innovation does not refer to a product or process technology, but of course includes the development of new artefacts (products). In the context of transformative innovation policy we are interested in innovation which builds up new socio-technical systems.

REFLEXIVITY
This notion refers on the one hand to the ability of actors to reflect on their own routines, and worldviews, the routines, position and worldviews of other actors, and the rationality. In some countries supply is intermittent rather than continuous and, of course, there are significant differences in the prices for use of electricity in different countries. The poor in a number of countries may have to pay in advance for access.
SECOND ORDER LEARNING
Or deep learning refers to a process in which routines are questioned. This includes a fundamental rethink of how problems are defined, and what solutions are considered appropriate. First order learning refers to a process in which routines are sharpened and become better defined. For example in a project on carbon calculations the actors can seek to optimize the calculations but also more fundamentally question the design and use of these calculations.

SOCIAL NEEDS
While transition is specifically related to social and environmental sustainability which is taken to be a social need, there are other social needs that may stand alongside or complement transition to sustainability. Examples include health, quality of life, and social justice (which are all included in a broad definition of sustainable development, and captured by the UN sustainable development goals).

SOCIO-TECHNICAL REGIME
In our project we look at sets of routines which are often aligned. This is what we call a socio-technical regime. We can make a distinction between heuristics (design rules, search rules); policy routines, user routines (preferences), cultural routines (expectations, perceptions, frames). These routines can be formal and informal. An example of formal ones are published standards; examples of informal ones are rule of thumbs or norms people follow.

SOCIO-TECHNICAL SYSTEMS
Norms, routines, and standards (regimes) become expressed in socio-technical systems. Such a system is a configuration of actors (their knowledge, skills), technologies (products, infrastructures), and institutions (regulations, cultural symbols, markets) for fulfilling a certain societal function (mobility; or inland mobility; urban mobility).

Example: The socio-technical system of grid distributed electricity includes the power plants, the electrical power cabling, the safe wiring of newly constructed buildings, and the existence of public or private arrangements for generating and distributing electrical power. Markets are: use of electricity in homes or businesses for purposes of illumination, heating, motors or powering electronic devices.

This is a large system with many different societal and technical features. It is over a century old and although it is not universal, about 85% of the human population participates in this system. In terms of relations between people, large numbers of people participate in this system as consumers using a myriad of electricity using technologies while a much smaller number of people are responsible for the generation and distribution of electrical power. One might imagine an alternative socio-technical system involving household generation of electrical power without connection to the grid. In this system there are very different relations between people (e.g. there are not separate groups of people engaged in the supply of electrical power). This alternative system would also create different relations between people and technology (e.g. it is likely that one would have to more carefully plan for how much electrical energy one uses and when it is used) and this alternative system is likely to be associated with different social, cultural or political models.

TRANSFORMATIVE
In our context, there are two important meanings for this adjective as applied to innovation: 1) a break or distinction from past practices or routines which opens new possibilities for further innovation across a broad front or over a wide variety of contexts (i.e. this definition is a qualitative statement of the potential or an achievement being large as compared to other innovations) and 2) further to 1), a process that establishes a new directionality.

TRANSITION
In its simplest form, the change from one socio-technical system to another (which thus also implies a change of regime, e.g. rules). The term is usually built on the premise that current socio-technical systems are not socially or environmentally sustainable and there is a social and/or economic need for a specific type of transition, one whose directionality is more compatible with social or environmental sustainability.
EXPLORE FURTHER

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