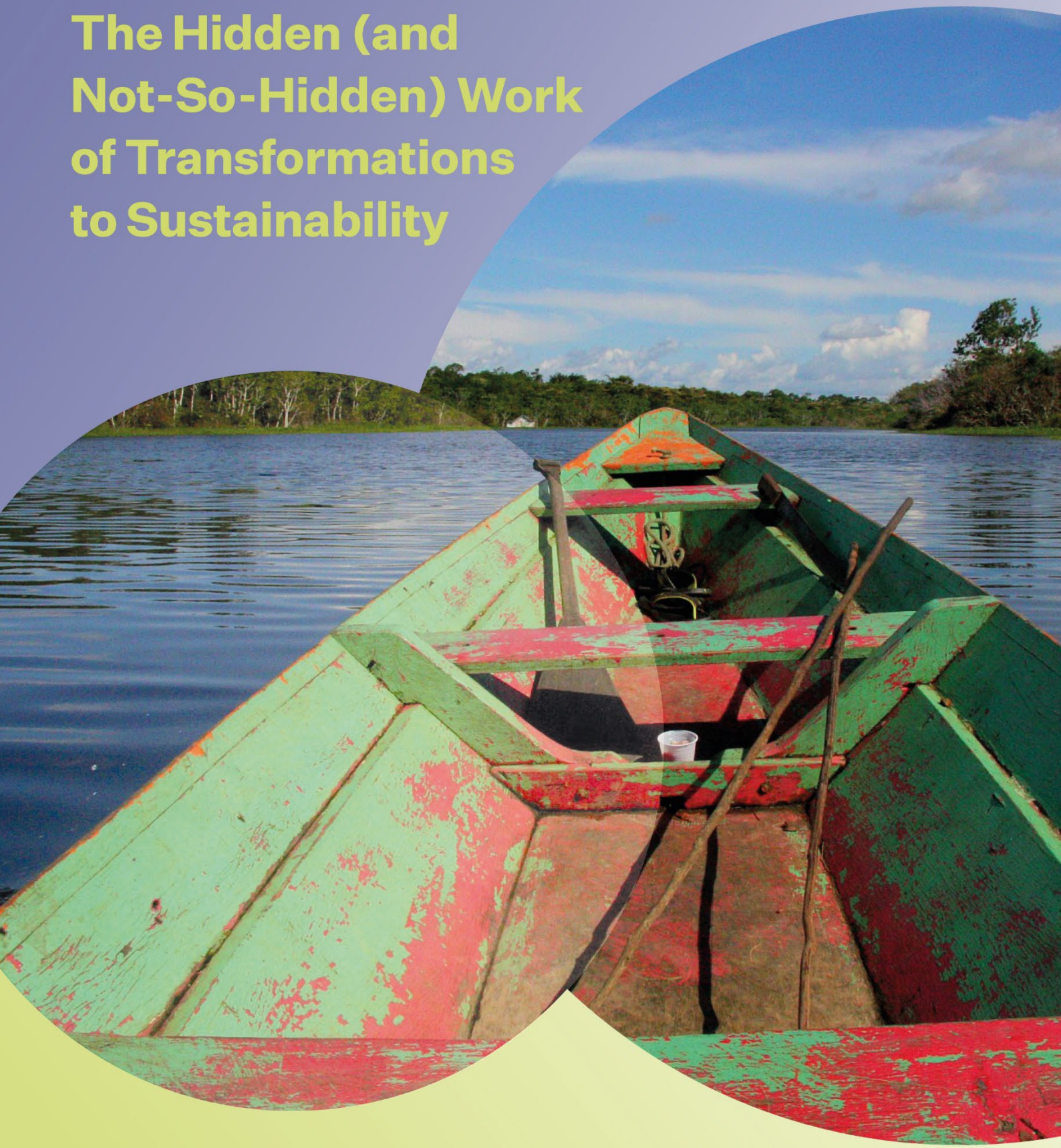
Transformative Labour:
The Hidden (and Not-So-Hidden) Work of Transformations to Sustainability



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Transformative Labour: The Hidden (and Not-So-Hidden) Work of Transformations to Sustainability

Integrative insights from three Transformative Knowledge Networks (2016–2019)

Contents

Prefatory note

From 2014 to 2019, the International Science Council (ISC) coordinated the Transformations to Sustainability research programme, in this report referred to as T2S1, with funding from the Swedish International Development Cooperation Agency.

The ISC commissioned a synthesis study of the T2S1 programme in 2021, which resulted in the present report:

- Moser, S. 2024a. *Transformative Labour: The Hidden (and Not-So-Hidden) Work of Transformations to Sustainability. Integrative Insights from Three Transformative Knowledge Networks*. International Science Council. This report focuses on insights into transformations to sustainability yielded by the three projects funded under T2S1.
  DOI: 10.24948/2024.04

From 2017 to 2022, the Belmont Forum, the New Opportunities for Research Funding Agency Cooperation in Europe (NORFACE) network and ISC collectively funded and coordinated a second iteration of the Transformations to Sustainability programme, in this report referred to as T2S2.

The funders of the T2S2 programme decided in 2021 to commission a study of substantive and programmatic learning. This study resulted in two reports:

- Moser, S. 2024b. *Social Transformations to Sustainability through a Critical Lens: Integrative insights from twelve research projects funded under the Transformations to Sustainability research programme*. Belmont Forum, International Science Council, NORFACE. This report focuses on insights into transformations to sustainability from an analysis of the outputs of the twelve projects funded under T2S2.
  DOI: 10.24948/2024.03
- Mukute, M., Colvin, J., Burt, J. 2024. *Programme Design for Transformations to Sustainability Research: A Comparative Analysis of the Design of Two Research*

Programmes on Transformations to Sustainability. Belmont Forum, International Science Council, NORFACE. This report focuses on a comparative analysis of the design of T2S1 and T2S2.
DOI: 10.24948/2024.02

Together, this package of three reports presents some of the key insights and learning from nine years of research programming on transformations to sustainability.

The NORFACE network, Belmont Forum and the ISC would like to thank all project teams, project participants and interviewees who informed these reports.

Disclaimer

The information, opinions and recommendations presented in this report are those of authors of the report, and do not necessarily reflect the values or position of the ISC.

List of acronyms

EJ Atlas	Global Atlas of Environmental Justice
ESD	Education for Sustainable Development
GWF	Gurgaon Water Forum
ISC	International Science Council
NGO	Non-governmental organization
NORFACE	New Opportunities for Research Funding Agency Cooperation in Europe
Sida	Swedish International Development Cooperation Agency
TKN	Transformative Knowledge Network
T-Labs	Transformation Labs
T2S	Transformation to Sustainability programme (comprehensively)
T2S1	The first T2S programme, coordinated by the International Social Science Council (later the ISC), with funding from Sida
T2S2	The second T2S programme, funded by the Belmont Forum, NORFACE and the ISC/Sida
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

Foreword: Breaking the mould with transdisciplinary research for sustainability

The Transformations to Sustainability (T2S) programme came to an end in December 2022 after nine exciting, challenging and rewarding years. The programme, launched in January 2014 by the International Social Science Council (ISSC, one of the predecessors of the International Science Council) with financing from the Swedish International Cooperation Agency (Sida), emerged out of a careful design process to create a research programme that would enable the social sciences to make their unique and much-needed contribution to sustainability science and action. As such, the T2S programme was a milestone in the history of international science and is still one of the most significant manifestations of international, interdisciplinary collaboration between the natural and social sciences on sustainability.

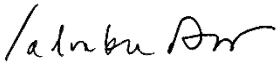
Inspired by the ISSC initiative, the Belmont Forum and the NORFACE network of social science funders launched a second phase with the ISSC in 2017, benefitting from top-up funding from the European Commission that made for a hugely significant step up in scale and scope for social science research cooperation and leadership in the domain of sustainability.

These unique international funding opportunities attracted an overwhelming response from a global research community hungry for support for a new type of research for sustainability based on transdisciplinarity. The two phases of the programme made it possible to test innovative transdisciplinary and internationally comparative research approaches and offered opportunities for more equitable research participation and leadership from the Global South. The 15 international research projects funded under the two phases of the programme studied and participated in transformation processes in many dozens of sites all over the world, working with communities experiencing a wide range of socio-environmental problems. What the projects all had in common was the social framing of the problems and potential solutions, deep involvement of non-academic partners and the effort to understand and facilitate processes of social change

towards more sustainable and socially just situations. They shared the ethos of care for people and planet that characterizes transdisciplinary research. Collectively the 15 projects have produced several hundred academic and non-academic outputs, involved thousands of non-academic participants in their research and had significant impacts on the course of communities' lives and on research directions and practice.

The three concluding reports on the T2S programme released in 2024 are rich in insights and learning which validate and extend the body of knowledge on social transformations and transdisciplinary approaches. The T2S programme has confirmed that integrated, transdisciplinary knowledge is an indispensable part of local and global efforts to achieve social and environmental sustainability, but also that science systems are still not conducive to mould-breaking, transformative research. The experience of the T2S programme adds weight to the evidence that science itself needs to transform, in its funding and incentive structures, evaluation cultures, training approaches and interfaces with practice, policy, society and the private sector, to achieve its potential to mitigate the urgent, existential risks to humanity we are facing. We hope that the example of the T2S programme will inspire other funders to mobilize resources for the kind of research that can help accelerate the achievement of the Sustainable Development Goals and long-term sustainable and just development.

Nicole Arbour
Executive Director,
Belmont Forum



Salvatore Aricò
Chief Executive Officer,
International Science
Council

Tomasz Zaleśkiewicz
Chair, NORFACE Network

Executive summary

This report synthesizes insights from the first generation of projects of the Transformations to Sustainability (T2S) programme of the International Science Council (ISC). The programme supported 38 seed grants over six months in 2014–2015, followed by three large, innovative international research collaborations ('Transformative Knowledge Networks' or 'TKNs') involving 26 individual case studies (2016–2019). The three TKNs focused, respectively, on the following:

- Transformative pathways towards sustainability (**Pathways**);
- Transformative and transgressive learning (**T-Learning**);
- Social resistance movements, and associated conflicts and struggles for justice and alternatives as loci of transformation (**ACKnowl-EJ**).

The synthesis is organized around seven key questions that many researchers and practitioners of transformations continue to engage with:

1. Where do transformations start from?

While it will always be difficult to identify starting points or thresholds at which transformations are triggered, hindsight may teach us to recognize the confluence of factors that distinguish a particular transformative period from the ongoing flux of history. Contributing factors may include ideas, hopes, inspirations, discoveries, desires or needs – but the one that repeatedly seemed to motivate actors to call for *intentional transformations to sustainability* was reaching a certain limit to the tolerance of injustice and suffering. This suffering in the case studies of the TKNs was the result of conflict/war, resource extraction and degradation, the manifest impacts of climate change, the loss of livelihoods, poverty, economic modernization and megaprojects.

2. How are social transformations conceptualized and defined?

Across the three TKNs, transformative change was described loosely as 'deep change' that alters configurations of economic and social systems and becomes visible through changed behaviours and material practices that shape environmental outcomes, in policies and resource flows, social relations and power dynamics, as well as in mindsets. This implied a broad conceptualization of sustainability, a commitment to bottom-up transformation and an interest/focus on interpersonal and intrapersonal processes.

3. Why are transformations so difficult to achieve – and to see?

Transformative change goes not only deep, as the conceptualization above suggests; it also can be complex, lengthy, happening for long periods in the dark, out of plain sight, involving any number of actors at different scales, but typically beginning on the margins of society. It aims at the deep, hidden aspects of systems that can be taboo in common discourse. The three TKNs addressed these deeper social forces that hold unsustainable and unjust systems in place. While not new, this focus is commonly neglected in research, perhaps because it is difficult to do, and perhaps because it fundamentally questions the major tenets of Western culture in the Global North, where most transformations research has been funded to date.

4. What can be done to foster transformations?

The report introduces the concept of 'transformative labour,' a novel conceptualization of age-old work – inner and outer, visible and invisible – that has the power to effect transformative change. Building loosely on the concept of emotional labour, it is the often hidden and largely underappreciated work of breaking through existing systems, and putting creativity, courage, persistence and other physical, social, cognitive and emotional qualities and skills to work along with physical and financial resources towards achieving system-transcending change.

5. How to contribute to and achieve transformations?

The report introduces and describes in detail seven categories of transformative labour: (1) detecting and naming (starting) conditions (symptoms); (2) creating transformative spaces; (3) fostering agency and empowerment; (4) enacting steps to change conditions; (5) visioning and moving towards desired outcomes (purpose, horizons); (6) caring, tending and learning; and – relevant also to the next question – (7) scaling out,

up and deep (Figure ES 1). These types of transformative labour overlap and interact. They are not simplistically linear, nor only undertaken once in a transformation process. The work in transformative labour is multifaceted, iterative, ongoing, varies by type and in intensity, can be antagonistic and confrontational and/or bridging and unifying, highly situational, deployed proactively or reactively, strategic or intuitive and can be de-constructive and destructive and innovative, creative, (re)generative and (re)constitutive. Transformative labour is undertaken by researchers and other societal actors involved in the transformation process.

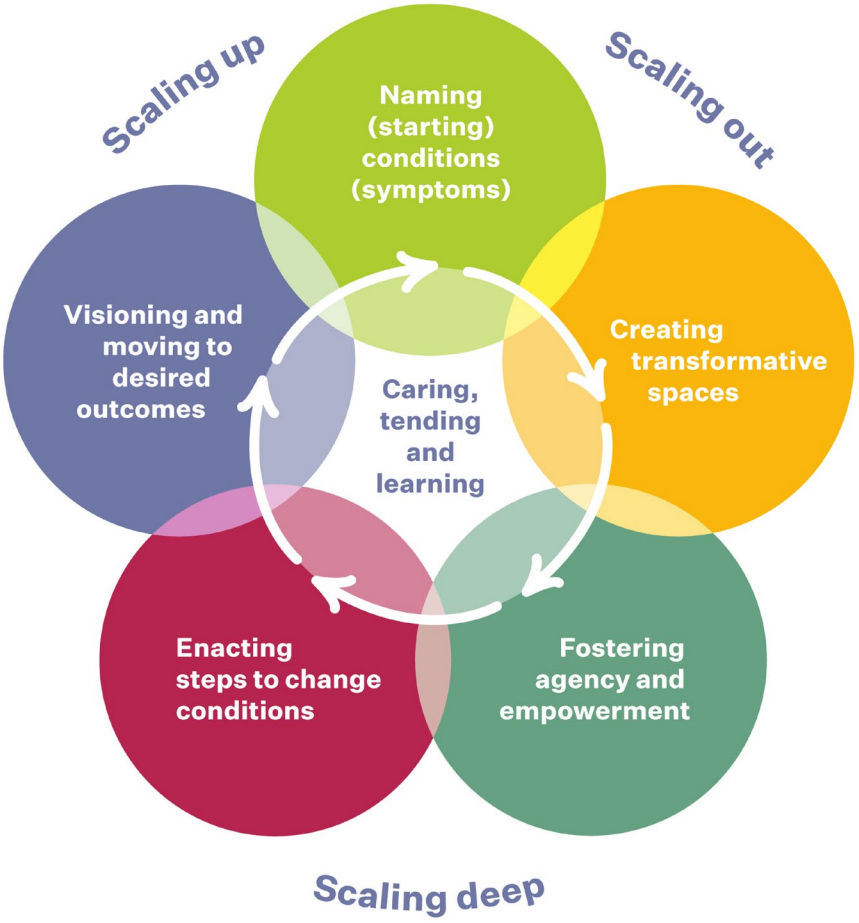


***Figure ES 1**: Types of transformative labour in dynamic relationship with each other*

6. How do transformations proceed and how can they be scaled?

When transformative efforts are still in their early iterations, expectations of system breakthroughs and outwardly visible changes may be unrealistic or should be tempered. The TKNs stepped into and engaged with ongoing transformative processes, which showed signs of the archetypal arc of transformation that – paradoxically – begins with an ending and ends with a new beginning, with a long and messy 'nowhere land' in between. Each TKN contributed unique insights on this undoing and remaking of system conditions. By contrast, none of the TKNs explicitly studied the potential for or process of scaling. Yet, each exhibited efforts in horizontal replication of efforts (scaling out), vertical, cross-scale efforts in affecting higher-order policies and system conditions (scaling up) and in working for deep changes in mindsets and relationships (scaling deep).

7. What is the role of science and of scientists in transformations to sustainability?

Transformations to sustainability are deeply, and fundamentally, political processes, which makes transformative labour system-transcending and inescapably political. The T2S researchers were willing to step into this 'agora.' In so doing, they walked the tightrope of using the tools of science to create deeper understanding of the situations at hand, but also to question the very nature, role and forms of science. Out of this critical reflection on science in the midst of and participating in the difficult processes of transformation emerged the novel concept of 'political rigour' and serious engagement with a series of archetypal roles that scientists might play in this politically rigorous, conscious way in the transformation process.

While the concept of transformative labour found great resonance with the second generation of research projects in the T2S programme, future research must further validate and refine it in independent projects and contexts. This synthesis simply tried to give a name to the critical work of researchers and actors labouring everywhere for a world in which life, dignity and justice are still possible.

1. Introduction

1.1 Background and purpose of this paper

Transformations and transitions research are growing areas of scientific investigation and practical and political interest in the context of the global environmental change which will make transformations of some kind inevitable. Unchecked, society will be forced to experience transformations imposed on it due to massive and dangerous biodiversity loss, climate change, extraction of natural resources and pollution and all their derivative effects, especially in their interaction with social ills. Or it can choose to transform deliberately to avert major, repeated, concurrent and causally linked systemic crises and move towards safer planetary and human futures.

While considerable time and research have been invested in understanding the physical transformation of Earth systems as a consequence of the growing human footprint on the planet, the human and social dynamics of environmental change are far less well-established, and very little is known about the possibilities for intentional transformations to sustainability.

That said, over the past decade or more, a research field and community of practice around transformations to sustainability has been forming, aided in part by international research funding programmes, international transformations-oriented conferences and a variety of research clusters emerging and/or coming together. This paper selectively synthesizes insights from one of these programmes – the Transformations to Sustainability programme of the International Science Council (ISC)[1]. In its first round of funding the programme supported 38 seed grants over six months (in 2014–2015), followed by three large, innovative international research collaborations ('Transformative Knowledge Networks' or 'TKNs') involving 26 individual case studies (2016–2019).

[1] https://transformationstosustainability.org/

The three TKNs focused, respectively, on the following:

- Transformative pathways towards sustainability (**Pathways**);
- Transformative and transgressive learning (**T-Learning**);
- Social resistance movements, and associated conflicts and struggles for justice and alternatives as loci of transformation (**ACKnowl-EJ**).

Over the three-year project lifespans, the three TKNs frequently interacted and collaborated on emerging challenges, discoveries, methodologies and frameworks, and some of the insights resulted in joint publications (ISC-T2S Programme, 2020). However, producing an overall integrative synthesis was beyond the capacity and resources of the TKNs. This report attempts an integrative synthesis by bringing into conversation selected aspects of what the TKNs and their individual case studies produced. It speaks to shared insights and foci and organizes them around key questions that many researchers and practitioners in the transformations space are currently engaged with. The TKN coordinators reviewed and commented on a draft of this report, and modifications were made to reflect their input. In addition, researchers involved in the second-generation Transformations to Sustainability programme[2] also provided reflection at the programme's final meeting in Paris in November 2022, which was a fruitful opportunity to test the ideas presented here with a related but independent set of cases.

1.2 Three Transformative Knowledge Networks: A brief introduction

The three multinational projects and the knowledge networks that they formed operated across a total of 20 countries across five continents, with significant representation of sites and researchers based in the Global South (Figure 1). Partnerships and comparisons with those located in the Global North made the T2S programme unusual. Below, each TKN is introduced briefly to provide context for the broader, cross-cutting insights discussed subsequently. More detail is available from the respective sections

[2] https://t2sresearch.org/

on the T2S programme website[3] and – where still available – each TKN's own website, as indicated.

Pathways – The '*Transformative pathways to sustainability: learning across disciplines, contexts and cultures*' TKN examined and contributed to building social transformations pathways in the context of environmental change in six sites around the world – Argentina, Mexico, Kenya, China, the UK and India. Its material foci fell into three domains: (1) sustainable agricultural and food systems for healthy livelihoods (UK and Argentina); (2) low-carbon energy transitions that serve the needs of the poor (Kenya and China); and (3) waste and water management in cities (India and Mexico). Each of these issue areas were approached through paired comparative research in low-, middle- and high-income countries. Researchers paid close attention to the historical, economic and cultural contexts in each site; and together with societal partners (different in each case) created 'Transformation Labs' (T-Labs) in which the sustainability challenges could be co-defined (and iteratively redefined), and pathways out of the status quo – i.e., away from the degraded situations towards alternative futures – could be envisioned, initiated and experimented with.

The Pathways project contended, like the other two TKNs, with issues of power, justice and the legacies of systemic and historical disadvantages (e.g., stemming from colonialism and racism); and delineated different types of transformations and the roles that researchers may play in them by creating and facilitating engaged, collaborative dialogues about transformations.[4,5]

T-Learning – The '*Transgressive social learning for social-ecological sustainability in times of climate change*' TKN focused on radical, emancipatory forms of learning-centred transformation. Setting out from the premise that deep systemic change requires shifts in values, worldviews, cultural norms, attitudes and resulting social practices, this TKN focused on the processes of learning and empowerment to create

[3] https://transformationstosustainability.org/

[4] https://transformationstosustainability.org/outputs/pathways/

[5] https://steps-centre.org/project/pathways-network/

alternative social realities in the context of the climate–energy–food–water security and social justice nexus.[6]

Working across four continents and nine countries (Colombia, Ethiopia, Malawi, South Africa, Zimbabwe, India, Vietnam, the Netherlands and Sweden), as well as across a range of societal sectors (academia, government and various groups within civil society) in each of the case studies, projects uncovered and enabled transformative and transgressive forms of learning processes. Taking a strongly normative position, participants in the T-Learning TKN worked towards 'reframing dominant narratives in education and learning spaces. It embraces a commitment to the commons and the common good, to decolonization, the good life, ecological economics, real sustainability and will seek to bring social and environmental justice into being.'[7] Key themes in this TKN included transgressive, transformative, emancipatory learning, empowerment and change agency, pedagogical practices, social and cognitive justice, decolonial practice in knowledge co-production, and the different roles and positions researchers may take in the process of transdisciplinary research.

ACKnowl-EJ – The '*Academic-activist co-produced knowledge for environmental justice*' TKN researched and engaged with 'the transformative potential of community responses to extractivism and alternatives born from resistance.'[8] Building on years of prior research which resulted in the now well-established EJ Atlas (Global Atlas of Environmental Justice),[9] the projects constituting this TKN focused on the impacts and responses to 'extractive activities, including mineral, biomass and fossil fuel extraction, [which] cause wide-ranging social and environmental impacts, from the depletion of natural resources to social tensions and conflicts through threats to territories, communities and lifestyles. Community responses to these activities call into question who has the right to decide and whether any one vision of development should be imposed over others.' (Rodríguez et al., 2023). In addition, in some of the projects,

[6] https://transformationstosustainability.org/outputs/t-learning/

[7] https://transgressivelearning.org/

[8] https://transformationstosustainability.org/outputs/acknowl-ej/

[9] https://ejatlas.org/

participants developed alternative visions of how human communities can live in harmony with each other and the natural environment, how they can govern themselves and achieve high levels of wellbeing, emancipatory levels of education and self-determination.

This TKN involved ten case studies in India, Bolivia, Turkey, Venezuela, Lebanon, Belgium, Canada and Argentina. Key themes in this TKN included social movements, resistance struggles, empowerment, radical social transformation, environmental justice and conflict transformation. It grappled with political rigour – defined as the critical realist stance towards 'truth,' acknowledging the possibility of multiple truths, and 'being politically informed and thorough, sensitive and nuanced, and timely and relevant' vis-à-vis those being engaged (Temper et al., 2019) in the process of knowledge co-production and regarding the role of scientists vis-à-vis activists working together towards transformative change.

Figure 1: *Map of the world showing the locations of case studies for each of the Transformative Knowledge Networks (TKNs).*

Map source: www.pngkit.com

1.3 Overview of this synthesis

The sections that follow are structured around seven questions:

1. Where do transformations start from?
2. How are social transformations conceptualized and defined?
3. Why are transformations so difficult to achieve – and to see?
4. What can be done to foster transformations?
5. How to contribute to and achieve transformations?
6. How do transformations proceed and how can they be scaled?
7. What is the role of science and of scientists in transformations to sustainability?

These are pressing questions, though certainly not a complete set, but ones that those interested in transformations – researchers, activists, policy-makers and funders – are continually asking. While many researchers are contributing insights on these questions, this report draws on the substantial knowledge and experience gained by the three TKNs. Collectively, they conducted 26 case studies over three or more years. The answers offered to these seven questions may not constitute a final or all-applicable set, but they are rooted in this substantial empirical basis in both the Global North and South. More than just summarizing the work done, the report aims to offer a novel theoretical contribution that emerged from this exciting work. In the conclusion, the report summarizes and looks forward in hope of informing further progress on the pressing challenge of transformations to sustainability.

2. Seven questions about transformations to sustainability

2.1 Where do transformations start from?

While it will always be difficult to identify starting points or thresholds at which transformations are triggered, hindsight may teach us to recognize the confluence of factors that distinguish a particular transformative period from the ongoing flux of history. Contributing factors may include ideas, hopes, inspirations, discoveries, desires or needs – but the one that repeatedly seems to cause actors to call for *intentional transformations to sustainability* is the limit to the tolerance of injustice or suffering.

In the cases studied by the TKNs, the transformations were not initiated by the researchers; activists, scientists and sometimes policy-makers at various levels were among those who called for them when injustice and suffering – experienced or anticipated – became intolerable. In the global context of increasing interest in transformative change, most pressingly, the motivations for transformations to sustainability are rooted in the conditions of environmental, social, political and economic unsustainability. These degrading conditions have already pushed many past the point of acceptance of the foundations for a dignified life (Raworth, 2017). Moreover, the physical and ecological systems globally have now crossed five of the nine planetary boundaries that mark humanity's 'safe operating space' (Steffen et al., 2015; Newbold et al., 2016; Gleeson et al., 2020; Persson et al., 2022; Wang-Erlandsson et al., 2022). No one, however, *directly* experiences planetary systems, global conditions or the crossing of planetary boundaries. Instead, these threshold crossings are manifest in the local contexts in which the TKNs chose to conduct their work.

These include the following situations:

- Conflict, war and disputes over territorial rights, and their environmental drivers and impacts;
- Excessive resource extraction and resulting degradation of the environment (e.g., mining and waste);
- Increasingly severe impacts of climate change, such as droughts, flooding, sea-level rise and resulting land loss and degradation, structural losses, impacts on livelihoods and food or water insecurity;
- Urbanization and related ecosystem and resource degradation and losses;
- Energy scarcity and the urgent need for a just transition to clean, renewable sources of energy to support lives, livelihoods and needed economic development;
- Degradation of conditions for productive agriculture, farmer livelihoods, food security and related natural resources/biodiversity losses;
- Poverty and its historical drivers and perpetual and pervasive social and environmental impacts;
- Economic development ('modernization') and related social and cultural transformations;
- Mega projects (e.g., hydropower dams, tar sand development and industrial reconfigurations) and related displacement and loss of livelihoods.

Table 1 shows the themes or conditions of unsustainability that the case studies in the TKNs focused on (as discerned from their written outputs),[10] and what – broadly – motivated the desire for transformative change, with some of the projects addressing cross-cutting or broader (un)sustainability questions.

[10] It is quite possible that those on the ground would find many additional factors of relevance in their situations. Thus, this table should be read as a reflection of what was discussed and emphasized in the published papers, rather than as a complete account of the relevant challenges or drivers at play.

***Table 1**: Conditions of unsustainability of central concern in the case studies of the TKNs. Source: Compiled by the author from the project websites*

		Unsustainable conditions									
TKN	**Country**	Conflict, war and territorial rights	Resource extraction and degradation	Climate change impacts	Urbanization and ecological impacts	Energy scarcity and transition	Agriculture and food security	Poverty and its roots in colonialism, racism	Economic modernization and transformation	Mega projects (various)	Not specified, broad or cross-cutting
Pathways	Argentina	■					■		■		
	UK						■				
	Mexico				■						
	India		■		■			■			
	Kenya					■			■		
	China					■			■		
T-Learning	Ethiopia	■	■				■	■			
	Malawi			■			■	■			
	South Africa (1)			■				■			
	South Africa (2)						■	■			
	South Africa (3)						■	■			
	South Africa (4)							■			■
	Zimbabwe						■	■			
	India							■			■
	Vietnam			■				■			
	Colombia		■	■				■			
	Netherlands	■					■				
	Sweden										■
ACKnowl-EJ	India (1)	■	■								
	India (2)	■						■			
	India (3)	■				■					
	Bolivia	■									
	Turkey	■	■			■					
	Venezuela	■	■			■					
	Lebanon	■			■				■		
	Belgium	■								■	
	Canada	■									
	Argentina	■	■								

The origins of these manifest and experienced local challenges typically have deep historical roots and are embedded in complex sociocultural relations and related worldviews/belief systems, in nearly all cases characterized by profound inequities, long-standing injustices and social norms of bias and exploitation. This simple table does not convey these intricate entanglements and even cross-issue connections. It only shows the central 'matters of concern' (Latour, 2004).

Of course, these conditions of unsustainability are by no means unique to the selected cases; rather, they are emblematic of the global trends described above. The three TKNs said little about why they chose those particular sites. Often, these choices were driven by experience and prior study, pre-existing relations or interests. Thus, there remain some unknowns about the moments of rupture in each of these cases where the desire for transformative change overcame past tolerance, compliance, complacency and (mal)adaptive suffering, which then initiated the transformative process. The Pathways TKN detailed the respective local histories for their cases (see table 2.2 in Ely and Marin, 2021), which illustrates a broader point: the research teams did not 'initiate' the transformative processes, but entered into them and contributed in ways that will be detailed later. To the extent that they were visible, the 'social tipping points' in each of the cases occurred when numerous – often uncoordinated and unexpected – events unfolded in a synergistic way. As with all social tipping points, however, the beginning of transformation cannot easily be pinned down to a particular event or shift. Its motivations lie in the cumulative suffering and losses (of human and non-human beings) that are experienced or anticipated, accumulating under prevailing norms and societal structures. This present or anticipated suffering must be experienced by a critical mass of actors to gain sufficient visibility, power and even support from unexpected sides, people or groups for alternatives to become viable and acceptable 'new ways.' This, in turn, builds the necessary pressure on the other individuals, collectives and institutions in society to overcome their hesitancy or resistance to seeking (or acquiescing to) deeper change (Andreoni et al., 2021; Juhola et al., 2022).

2.2 How are social transformations conceptualized and defined?

Across the three TKNs, transformative change was described loosely as 'deep change' that alters configurations of economic and social systems. These deep changes become visible outwardly through changed behaviours, changed relational work and material practices (including altered patterns of production and consumption that shape environmental outcomes), in altered policies and resource flows, social relations and power dynamics, as well as – internally – in changed attitudes, values, beliefs, framings and worldviews that constitute the cultures of communities and societies and how they understand their relationship to beyond-human nature. Differently put, the projects were not concerned with smaller adaptive adjustments, which would have left the prevailing systems that caused the encountered unsustainable conditions intact.

Table 2 distils the definitions of transformative change broadly shared across the individual cases in each of the three TKNs, recognizing that no definitional straight jacket was imposed on any one case. Instead, the TKNs insisted that societal partners in each case should have their own voice in shaping the understanding of the transformative shift being explored. The differences in conceptualizing transformative change that were found in the resulting publications nonetheless point to differences in the TKNs' research foci. They reflect the ethical commitment to allow understandings to emerge from the work with the unique groups of societal actors in each case.

***Table 2**: Definitions of transformative change across three TKNs*

TKN	Definition	Elaborations
ACKnowl-EJ	A process in which conditions of injustice and unsustainability undergo profound changes towards situations of justice and sustainability (Kothari et al., 2023).	Foci/dimensions of study: the combination of objectives and intentions, practices and visions, and ethics and values guiding the actions of the relevant actors; decision-making, economic security, community-state relations, knowledges, values, equality in all socio-demographic aspects, reduction of violence in all forms (direct, cultural and structural), collective visions of futures, etc.
T-Learning	Processes that lead to paradigm shifts, which enable doing things differently, so as to successfully address 'wicked' (sustainability) challenges (Lotz-Sisitka et al., 2015).	Foci/dimensions of study: addressing the root causes of unhealthy resilience through breaking down inherently unsustainable systems, practices, routines, ways of thinking and the development of disruptive capacity and competences needed to do so.
Pathways	Deep change processes that alter particular configurations and co-evolution of dynamic interacting social–technological–environmental systems; aimed at simultaneously addressing challenges of environmental sustainability, poverty alleviation and social justice. Recognizing that complex problems require complex responses, without imposing a singular theory of transformation nor a particular pathway (Ely et al., 2022).	Foci/dimensions of study: the agency and uncertainties in choosing aims and direction of transformation; values, knowledges, power relations, identities and system framings. Distinctions: *structural* (deep change in the structural relations of politics, economy and society); *systemic* (change in system traits, e.g., actors, technologies and governance); *enabling* (human agency, collective action, mobilization, emancipation, values and beliefs/knowledges) (Ely et al., 2020; Scoones et al., 2020).

Several important insights emerge from this comparative listing of definitions:

1. There is a common commitment to a broad interpretation of sustainability, always involving environmental, economic/livelihood and social justice concerns.
2. Equally important is the commitment to the *bottom-up* fostering of transformative change, rather than top-down interventions.
3. Implicitly or explicitly the TKNs share an interest in intrahuman and interhuman processes involved in readying the ground, mobilizing for, initiating and advancing transformative change.
4. Each of the TKNs reveals its emphasis on 'deep' systemic change, not merely technology transitions or policy fixes, even if they are an integral part in these complex transformations. Differently put, they are not just interested in adapting existing systems or optimizing their functioning, but in changing the systems (not 'doing things better' but 'doing better things').

Together these similarities are important, as they point to where to work and look for transformative change. In other words, based on these definitional parameters, one should not only look for the 'easily visible' changes in activities, policies or technologies in use. It requires a far deeper look – and work – to bring about systems changes, which also suggests why such changes would be much harder to detect.

2.3 Why are transformations so difficult to achieve – and to see?

A search for the activities that take place along the entire trajectory of transformative change – whether intentionally enacted or recognizable only from a distance or in hindsight – is an interesting exercise. Transformative change goes not only deep – as the definitions listed above suggest; it also can be complex, lengthy, happening for long periods in the dark, out of plain sight and involving any number of actors – at specific and across various scales of deliberation, strategizing and action. Moreover, as many of the case studies undertaken by the TKNs show, they do not begin 'in the mainstream,' but on the margins of society: often undertaken by those who are marginalized by the dominant sectors and segments of society. In fact, it may not be until they affect larger

majorities of society that they become more visible and recognizable as transformations.

There are several proximate reasons then why transformation is so hard to see:

- It seems to start from and take place in out-of-sight (marginal) sites;
- It is spatially distributed;
- It unfolds often over long periods of time;
- It aims at the deep, hidden aspects of systems that can be taboo in common discourse.

These difficult-to-detect qualities often remain elusive to all but (and sometimes even) those deeply engaged, and consequently is hard to deliberately foster. Thus, it is entirely possible for aspects of transformative change to be occurring while one is still asking the urgent and sometimes desperate question, 'Why are we not transforming – despite decades of clear understanding of the problems and even targets and policies meant to achieve them?' (paraphrasing Andrew Stirling, [ISC, 2022, 04:02]).

The TKNs, in searching for the deeper reasons, particularly for why aspects of this change seem to be taboo, provided various important, if partial answers:[11]

- Economic imbalances/inequalities, and the self-perpetuating functioning of systems such as capitalist market-based economies, that are highly resilient in maintaining the unjust and exploitative status quo;
- Institutional arrangements (e.g., subsidies, norms and regulations) that stabilize systems of unsustainability, even past the point of damage and degradation of the resources on which they depend, resulting in continued extraction and inequality;
- Deeply entrenched interests of those in positions of power and privilege, that actively work to prevent and disrupt transformative change;
- Dynamics of socio-technical lock-in that compound entrenched interests and prevent shifts towards sustainable patterns of development;

[11] https://youtu.be/NGI_sc0WsUk

- Exclusion of marginalized, directly affected actors in deliberations over policies and decisions;
- The shear complexity of 'wicked' challenges that makes it seemingly impossible to make any progress without causing further problems;
- Ways of thinking and framing systems and challenges that do not allow for opening to novel and alternative visions of the future nor for forward movement (i.e., path dependencies);
- Emotional challenges, such as blame, disavowal, status quo bias, resistance to change, discomfort with uncertainty, disruption and disorderly change.

The three TKNs – all led by social scientists – addressed precisely these deeper social forces that hold unsustainable and unjust systems in place. While such a focus is not new, it is by far the most commonly neglected area in research, perhaps because it is difficult to do, but perhaps also because it so fundamentally questions the major tenets of Western culture in the Global North, where most research on this topic has been funded to date. Nevertheless, there is important and relevant work from the collective impact literature and systems thinking in various disciplines that has contributed to our understanding of these conditions – separately and in concert. Together they can be abstracted to the forces or conditions that hold unsustainable, unjust systems in place, even when their flaws are recognized and contested (Figure 2).

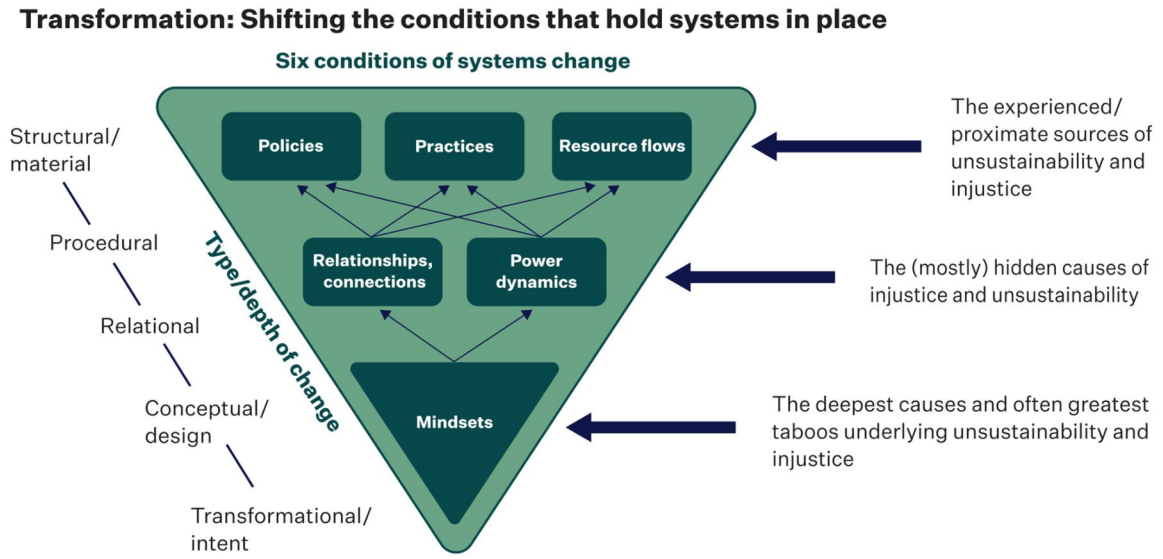


***Figure 2**: Transformation to sustainability as the work of shifting the conditions that hold unsustainable, unjust systems in place. Source: Modified from Moser (2019) and Shi and Moser (2021)*

As Figure 2 illustrates, the most visible aspects are the experienced or proximate causes of unsustainability (i.e., unjust, damaging or inadequate) policies, practices and resource flows. They come about from decisions made by a subset of actors in positions of power who have certain relationships and connections (while lacking others) and power dynamics with each other. In turn, who gets to be at the table in a position of decision-making power ultimately derives from particular interests and associated mindsets, worldviews, belief systems, paradigms and values. These, however, are rarely openly questioned by those who hold those positions.

Wishing to transform systems and situations fundamentally thus points to work not just at the surface, i.e., the experienced or proximate forces, but at the deeper, often hidden and sometimes taboo drivers that hold systems in place. This requires making these deeper and hidden dynamics visible, lifting up the voices of those unheard amidst self-perpetuating systems of dominance that wish to hide or distract from them. It also implies a necessary (Freirean) conscientization of those in marginalized, oppressed and exploited situations to help them see themselves in these larger systems; name their conditions; discover and build their strengths and skills to effectively subvert the systems of dominance; and empower themselves to fight it, undermine it and envision

and build alternatives. A reading across the three TKNs results in locating them in the midst of this difficult, but necessary work.

2.4 What can be done to foster transformations to sustainability? Introducing the concept of 'transformative labour'

Having located the work of the three TKNs 'in the deep,' this section introduces the concept of 'transformative labour,' which is a novel conceptualization and defined here as the age-old work – inner and outer, visible and invisible – that has the power to affect transformative change.

The concept of transformative labour loosely builds on sociologist Arlie Hochschild's notion of 'emotional labor' [Hochschild, 2012 (1983)] and shares some interesting commonalities and interrelations, but also some critical differences (Table 3). When Hochschild first introduced the notion of emotional labour, she wished to bring attention to an undervalued and easily overlooked phenomenon, and to name and therefore appreciate a kind of labour – all too often carried out by women – that was assumed, required and often exploited for 'adequate' job performance but not publicly acknowledged and honoured, and which often had deleterious impacts on the one's performing it, in the form of a kind of alienation from one's true self. She defined emotional labour as 'the management of feelings to create a publicly observable facial and bodily display' and noted that 'emotional labour is sold for a wage and therefore has *exchange value*' (p. 7).[12]

Initially primarily focused on waitresses, airline hostesses and similar 'service' professions, the notion of emotional labour has since been adopted in many contexts. For example, some important recent work applied it to climate-change scientists who must hide their distress in public over what they understand their science to mean (e.g., Head and Harada, 2017). Another recent study acknowledges the 'affective labour' involved in science, technology and society research (Branch and Duché, 2022) but

[12] In private contexts, Hochschild used the term *emotion work* or *emotion management*, where it has *use value*.

does not describe the types of labour undertaken in the context of transdisciplinary research on transformations to sustainability.

Why add yet another concept to an already-crowded conceptual landscape where words quickly become overused or used in multiple divergent ways and always at risk of losing their original meaning? Introducing the notion of 'transformative labour' here is intended in much the same way as Hochschild did: to bring attention to, appreciate and value, a kind of labour that is essential to bring about transformative change. It brings attention to those doing that labour, and at considerable cost, in human and concrete terms, and thus tries to counter the more abstract, almost sanitized, often depersonalized and even dehumanized reference to 'social processes' involved in transformations to sustainability.

Box 1: A note on methodology

The work underlying the development of the concept of transformative labour was not empirical; nor was it based on a systematic, methodical coding of the publications of the three TKNs underpinned by a theoretical or conceptual framework. Instead, it emerged from a careful reading of those outputs and taking note of the recurring themes in the work reported there. The TKNs' conceptualization of transformations pointed to the depth, i.e., the often-unseen drivers of systems, and thus, into critical, feminist and decolonial thinking, which frequently aims to 'visibilize' that which is hidden from plain sight (e.g., Honneth, 2012; Solnit, 2014; Herzog, 2020a, 2020b). The goal to make a synthetic contribution above and beyond the extensive theoretical, methodological and empirical advances that the TKNs themselves produced informed the search for a cross-cutting framing. Bringing their work into conversation with the related but distinct and different notion of emotional labour resulted in this new and synthetic lens on the extensive work done and described by the TKNs. The comparison between transformative and emotional labour thus became a powerful lever to better understand the transformation process. The varieties of transformative labour (next section) emerged from grouping repeatedly mentioned work and interventions – in a sense an abstraction of the methodologies used across the 26 case studies – and relating them to each other in iterative ways. The discussion of outcomes drew on published and reported achievements.

The notion of transformative labour emerged out of the cross-reading of the various outputs from the three TKNs as a summative term to describe the various types and degrees of intensity of labour performed by both the researchers and the social actors interacting and partnering with each other, as they were engaged in transformative processes (Box 1). As the next section will show in greater detail, transformative labour varies by stage, actor and situational context (i.e., the transformation sought in a given set of circumstances or systems), but often comes at great cost (and in the best cases also with benefits) to those engaged in the process.

To be clear, the term 'transformative labour' as used here pertains to those actively involved in initiating, facilitating, instigating, fighting for, empowering, enabling and maintaining momentum so that transformations to sustainability happen. Many others – when and if these deep changes in fact succeed – may benefit from this labour, even if they themselves were only relatively passive (coping) 'passengers' on the move to a more just and sustainable world. As such, transformative labour is a service to society at large (perhaps even to the world), even if it entails curtailing or hindering the short-term benefits of those profit(eer)ing from unsustainable activities and privileged positions in the existing system.

Because of the particular foci and approaches chosen by the three TKNs, the transformative labour observed in the cases at hand is 'Davidian' (i.e., that of the underdogs, not of the respective Goliaths), often performed by those in marginalized positions, i.e., those who experience oppression, exclusion, stigma, denigration, extraction or abuse). They typically work from the grassroots up (compared to those in high positions working to direct, shape or 'social-engineer' transformations from the top down), and sometimes are supported by those who take up allyship with them, e.g., non-governmental organizations (NGOs) and academics. Emotional labour may be part of this transformative labour, but the latter goes well beyond the former, as will be discussed in the next section. Future research will need to examine whether, in what ways and to what extent the concept of transformative labour also applies to those in superior positions working to 'force' or support transformative shifts, or to those fellow members of society who must – in one way or another – come along with the transformative changes unfolding, even if they are not working to set them in motion.

Transformational labour differs in one key respect from the notion of 'emotional labour' in the way Hochschild meant it. Emotional labour is work performed in an extractive system to succeed and persist in it without challenging the status quo of a particular exchange of labour and wage. It is about fulfilling the emotional requirements of a situation, not labour aimed at changing the particular employment situation or its norms, but at performing in, and thus perpetuating, it 'as is.' By contrast, transformative labour, as described below, is *the often hidden and largely underappreciated work of breaking through existing systems, and putting creativity, courage, persistence and other physical, social, cognitive and emotional qualities and skills along with physical and financial resources towards achieving system-transcending change*. Very often – particularly when performed by marginalized, non-privileged groups and individuals – this labour does not have a wage-earning exchange value as in the case of emotional labour, although some actors involved (e.g., researchers or NGO staff) may be compensated for their expertise and time.

Table 3: *Comparison of the conceptualization of emotional and transformative labour*

	Emotional labour	Transformative labour
Definition	The mental–emotional work required to manage or perform the routine tasks necessary for maintaining relationships and ensuring smooth running of processes or performance at a job.	The work – inner and outer, visible and invisible – that is required to initiate, affect and navigate the difficult processes involved in achieving system-transcending, transformative change.
Intention	To name, bring attention to and appreciate an undervalued and easily overlooked form of labour that is assumed, required and often exploited for 'adequate' job performance.	To bring attention to, appreciate and value, a kind of labour that must be done, often at considerable cost (and benefits), to achieve transformative change. Describes the various types and degrees of intensity of labour performed by researchers and other social actors engaged in transformative processes.
Counter-cultural goal	Recognizes the often-deleterious impacts of performing emotional labour on the ones doing it (e.g., exhaustion and alienation from one's true self).	Brings attention to those doing that labour in human and concrete terms; thus countering abstract, almost sanitized, often depersonalized and even dehumanized reference to 'social processes' involved in transformations to sustainability.
Focus of study	Focuses on those performing emotional labour as part of their work, often women.	Pertains to those actively involved in initiating, facilitating, instigating, fighting for, empowering, enabling and maintaining momentum of transformations.
Essence of labour	Is 'survivalist' (i.e., reflecting strength and persistence) in systems that are not supportive of the whole person.	Is 'Davidian' (i.e., of the underdog), performed often by those in marginalized positions (and their allies), working from the grassroots up rather than the work of those in elite positions working to 'social-engineer' transformations from the top down.
Skills required	Requires awareness and acceptance/tolerance of social expectations and cultural norms, humour, stamina and self-control.	Requires creativity, courage, persistence and other physical, social, cognitive and emotional qualities and skills along with

	Emotional labour	Transformative labour
		physical and financial resources needed to achieve system-transcending change.
System orientation	Is typically performed in an extractive system to succeed in, but not challenge, it.	Is the risky and challenging work of breaking down or through existing systems and building new ones.
Benefits and beneficiaries	Helps to maintain employment for those performing it, and results in a wage (the 'exchange value' of emotional labour). It is also a service to the direct beneficiary of it (e.g., customers and clients) and indirectly, in some cases, even the public (e.g., scientists).	Those formally employed while working towards transformation may gain income; but many others involved are not compensated. The work is a service to society (maybe even the human species) at large. Many people benefit from it, even if they are only passive 'passengers' on the move to a more just and sustainable world. It also entails curtailing or hindering the short-term benefits of those profit(eer)ing from unsustainable activities and privileged ways of being.

The following section examines the notion of transformative labour in more detail: the variety of types and intensities of transformative labour observed in the work of the TKNs.

2.5 How to contribute to transformations? Varieties of transformative labour

As mentioned above (Box 1), a set of categories of transformative labour emerged from the cross-reading of the outputs (particularly the case studies and methods-oriented publications) of the three TKNs (Ely et al., 2020, 2022; Pereira et al., 2020; Scoones et al., 2020). It is conceivable that there could be more and differently labelled ones, especially for cases more advanced than the ones reviewed. The goal was not to 'cement' an often fluid and iterative process into simplistic and immutable boxes, or close the case on types of transformative labour, but to lift up and make visible various kinds of work into a manageable number of 'distinct enough' categories of transformative labour, so that it can be seen and traced – and perhaps in the future – more deliberately undertaken.

2.5.1 Types of transformative labour

Six categories of transformative labour were thus created (Figure 3):

- Detecting and naming (starting) conditions (symptoms);
- Creating transformative spaces;
- Fostering agency and empowerment;
- Enacting steps to change conditions;
- Visioning and moving towards desired outcomes (purpose and horizons);
- Caring, tending and learning.

***Figure 3**: Types of transformative labour in dynamic relationship with each other*

These categories overlap and interact. They are not simplistically linear, or only undertaken once in a transformation process. Rather, those engaged in them may jump from one to another, realize something is needed or not yet in place and return to an earlier category or one not yet undertaken. The process seems to be driven and held together not by some strategic game plan or ontological necessity, but by the caring,

tending and ongoing and deliberate learning that occurs among those involved in and committed to the process. Importantly, it is not only the work of the researchers undertaking the research reviewed, but all actors involved in working towards transformation. Figure 3 depicts this dynamic interrelationship and each type of transformative labour is described below.

Detecting and naming (starting) conditions (symptoms)

It might appear as a common task, particularly for researchers, to gather and analyse data on the conditions (e.g., physical, natural, economic and social) that give rise to the need, or cause a group of actors to wish, for transformative change. Sometimes, alarm bells are rung by scientists detecting and studying such conditions for the first time. Often, however, scientists choose cases where those most directly affected have already long borne and informally or even formally tracked those untenable situations. Part injustice, part restorative justice, is the fact that science can play a critical role in legitimizing claims of harm, visibilizing and bringing attention to injustice, destruction and suffering, and improve understanding of the causes and impacts of the state of unsustainability, injustice and/or conflict in contextually sensitive ways. Often this type of transformative labour can entail initiating difficult conversations – locally, in specific sectors or at relevant levels of government, about these conditions and their causes. It can involve putting uncomfortable questions to those in positions of authority or power. This category of transformative labour is a necessary early step, but is likely to be revisited again and again as conditions change, trusted relationships grow between local actors and researchers, understandings change and interventions are made to affect the situation.

Creating transformative spaces

The notion of creating 'transformative spaces' is taken directly from the Pathways TKN (Marshall et al. 2018; Pereira et al., 2018a, 2018b, 2020), but each of the projects engaged in this type of transformative labour and contributed to naming the tasks here. It involves creating 'safe enough' spaces for exploring the systems that must be transformed and dreaming/visioning alternatives (Kalpavriksh, 2017; McGarry, 2018). Often, in these spaces, room is made for voices previously not included or heard. It is the work of making space for and uplifting the 'missing.' Doing so can result in creating 'unconventional alliances' (e.g., van Zwanenberg et al., 2018). This, then, often means

enabling and facilitating dialogues, sometimes conflictual ones, that would not happen otherwise. The actual transformation of conflict may be required and can take a long time (Rodríguez and Inturias, 2018). Even if not navigating, managing and transforming outright conflict, for researchers and facilitators, this means working across the various 'boundaries' in the room – those between science and practice, those between disciplines or different interests and sometimes opposing factions in a political stalemate, or negotiating the volatile or even potentially dangerous encounters of opponents (e.g., Lotz-Sisitka and Pesanayi, 2019; Pesanayi, 2019). This set of tasks also involves finding a shared language. However, often more transformative is the difficult work of unlearning and eventually (re)learning conceptions of key tenets of the extractive, unjust worldview that led to the unsustainable situation. The most courageous work in this set of tasks is that of transgressing norms – cultural, professional, position-, class/caste- and gender-related prescriptions that have socialized participants in the transformative process into disempowered or otherwise limiting positions (Lotz-Sisitka et al., 2015, 2016, 2017; Macintyre et al., 2019; Temper et al., 2019; Kulundu-Bolus et al., 2020). Often the work also entails learning how systems work and envisioning new configurations and approaches, including in the process of research itself. The TKNs located the work of decolonizing minds and research practices here (Rodríguez and Inturias, 2018; Kulundu-Bolus et al., 2020; McGarry et al., 2021), as well as the work of transdisciplinary research itself – the co-design, collaborative data gathering and analysis, and the co-delivery and co-interpretation of results (Pathways Network, 2018; Macintyre et al., 2019; Ely et al., 2020; Chambers et al., 2022).

Fostering agency and empowerment

If the prior category of transformative work is more about ingathering and readying physical, social and mental space, this category is more about knowledge- and skill-building, but there is overlap, and both contribute to empowerment, so the distinction is by emphasis and degree. The TKNs described it as 'building transformative agency' (i.e., in the sense of understanding, will and skills) (e.g., Lotz-Sisitka et al., 2017; Charli-Joseph et al., 2018, 2022; Marshall et al., 2018). It also involves building or expanding networks of solidarity, which help to bolster the sense and actual capacity to change matters (e.g., Mudokwani and Mukute, 2019; Charli-Joseph et al., 2022; Rodríguez et al., 2023). In some instances (e.g., in the work of the ACKnowl-EJ network), it is about

learning the skills of organizing, movement building, civil disobedience and resistance and how to challenge existing power arrangements (e.g., Temper et al., 2018b). However, it also entails very practical cognitive, manual, social and political skills – learned in community with others (e.g., Chaves, 2015; Kulundu, 2019; Mohanty et al., 2019; Mphepo, 2019). This can involve and/or result in valuing all forms of knowledge; and through such empowerment redefining roles and navigating spaces in those new(ly assumed) roles. In the work of the TKNs, what stands out is how the researchers themselves reckoned with and redefined their roles, mindsets and approaches (decolonizing the research itself), considering their own positionality and consciously choosing to take up certain (archetypal) roles vis-à-vis their societal partners – something that will be discussed more in Section 2.7 of this report.

Enacting steps to change conditions

The emphasis in this category of transformative labour is on actions and changes in behaviour – and as such a set of actions that become more visible in public spaces. Yet the variety of interventions that those involved in transformative change might make is highly diverse and the examples given here are more a reflection of the specific cases rather than a statement of completeness. The range of steps that might be enacted in this category is as broad as the cases in question demand – i.e., unlimited. If the chosen strategy is civil resistance and movement building, as in the cases that the ACKnowl-EJ TKN examined and participated in, the actions may be more people participating (maybe for the first time) in acts of disobedience, resistance or protest (see case studies in Rodríguez et al., 2023). If the situation instead requires innovative approaches (technological or social) to addressing challenges in new ways, as in the cases of the Pathways TKN, then the steps might involve inventions, constructions, shifts in where energy or resources are sourced from, creative work-arounds where political or governance blockages prevent progress, new forms of governance or decision-making, new collaborations or new practices (e.g., in farming or land management).[13] Or, if the cases in question have to do with education and learning, as in the T-Learning TKN, then action steps might be about changing curricula, pushing for innovative education policies or innovative teaching practices and creation of novel, interactive learning spaces and environments (Lotz-Sisitka et al., 2015; Kulundu, 2019; Lotz-Sisitka, 2019;

[13] See also short video outputs on this case at https://transgressivelearning.org/multimedia/.

McGarry et al., 2021). In other words, this category is about moving in the experimental space of trying something new/different and dealing with the early successes and setbacks of this experimentation.

Visioning and moving towards desired outcomes (purpose, horizons)

The fifth category of transformative labour outlined here is in many ways about creating and maintaining the deep motivational anchor from which all the other work is sourced. It is about visioning and successively revisioning the alternative horizon towards which the transformation is intended to move (Kalpavriksh, 2017; Temper et al., 2018b). Because that is – ultimately – a difficult, long, uncertain and never-assured outcome, the work here is also in maintaining the physical and emotional stamina to keep working towards that ultimate purpose. What exactly these visions might look like is defined by the actors involved and thus highly contextual in its specifics, but in the cases described here, it is some combination of the key tenets of sustainability (environmental, economic and social), justice (cognitive, distributive, procedural and structural) and peace or the absence of violence. The work involved is both highly creative and inspiring, but can also require highly effective and adaptive leadership to hold divergent interests together by tending relationships and to sustain momentum when the established powers and interests inevitably threaten to block or undo progress made.

Caring, tending and learning

The final category of transformative labour cuts across and – as Figure 3 depicts – is central to the effective delivery of all other types of work involved in advancing transformative change. It is both source and outcome of the transformative labour performed in any of the other categories. Maybe best captured as 'instilling and living a persistent caring and learning attitude,' the labour here is centred around care – caring for the people involved (both the research team but also the societal partners in the projects) and for the places or issues at stake. As the TKNs reported over the years of their work, they took great care in tending the engaged research process itself, including the individuals, the dynamics within research teams and non-academic partners, and sometimes even about unrelated aspects (e.g., Kulundu-Bolus et al., 2020; Wals, 2020;

Dylan, 2022).[14] This needs to be balanced with the more disruptive, emancipatory and critical stances that researchers can take in supporting transformative change (e.g., Temper et al., 2019; Macintyre et al., 2020). While on some level these tasks might be described as negotiating boundaries and managing expectations (e.g., avoiding mission creep of projects, but also being responsive to emergent partner needs), they are fundamentally about developing and working out relationships. Trust building, of course, is an already widely recognized foundation for such collaborative work, but it cannot be emphasized enough as the core and 'pace-maker' of transformative labour. In effect, it reveals a certain emotional investment in the situations in which actors (including researchers) work. It speaks to the leadership skills needed to sense these interpersonal shifts, tend to them effectively and serve as guide, mentor, co-labourer or 'gardener' of the transformative space. It also involves deliberate learning through observation, seeking out feedback, formal evaluation and ongoing reflection – something for which each TKN developed unique practices.

Table 4 summarizes these six categories of transformative labour and which of the conditions that hold systems in place each tends to impact. This synthesis makes no claims that these conditions are changed or in what direction; it simply points to the loci of influence of specific types of transformative labour.

[14] This involved personal challenges, health issues, particularly at the tail end of the TKNs' work when the pandemic wreaked havoc across the world, as well as political threats and civil unrest, or any other issues that were shared once trusted relationships were established.

***Table 4**: Transformative labour's impact on the conditions that hold in place or transform systems*

	Impact on the conditions that hold in place/transform systems					
	Mindset	Relationships/ connections	Power dynamics	Policies	Practices	Resource flows
Detecting and naming starting conditions (symptoms)						

• Detecting, tracking, analysing, naming and publicizing problems
  • Unsustainability
  • Injustice
  • Conflict (in contextually specific ways)
	X					

• Initiating difficult conversations	**X**	**X**				
• Questioning convention	**X**		**X**			
Creating transformative spaces						
• Unlearning and (re)learning	**X**					
• Transgressing norms	**X**		**X**			
• Inviting the missing		**X**				
• Enabling dialogue		**X**	**X**			

	Impact on the conditions that hold in place/transform systems					
	Mindset	Relationships/ connections	Power dynamics	Policies	Practices	Resource flows
• Working boundaries		X			X	
• Decolonizing minds, research practices	X				X	
• Transdisciplinary research						
• Facilitating and transforming conflicts		X	X		X	
• Visioning/developing alternatives	X	X	X			
Fostering agency and empowerment						
• Building transformative agency (understanding, will and skill)	X		X			
• Building and expanding networks of solidarity		X				
• Community-based learning	X	X			X	
• Movement building		X	X		X	
• Challenging existing power arrangements			X			
• Valuing all forms of knowledge	X	X	X		X	
• Redefining and navigating roles	X					

	Impact on the conditions that hold in place/transform systems					
	Mindset	Relationships/ connections	Power dynamics	Policies	Practices	Resource flows
Enacting steps to change conditions						
• Enacting civic resistance			X	X	X	
• Participating in/forming movements pushing for transformative change						
• Innovating					X	
• Changing curricula				X	X	X
• Changing practices					X	X
• Policy guidance and change				X		
• Enacting alternative practices				X	X	
Visioning and moving to desired outcomes (purpose, horizons)						

• Enacting envisioned alternatives
  • Sustainability (environmental, economic and social)
  • Justice (cognitive, distributive, procedural and structural)
  • Peace/absence of violence
	X	X	X	X	X	X

	Impact on the conditions that hold in place/transform systems					
	Mindset	Relationships/ connections	Power dynamics	Policies	Practices	Resource flows
• Sustaining momentum of change	X	X	X		X	X
• Maintaining relations		X	X			
Caring, tending and learning						
• Emotional investment in situations	X	X	X		X	
• Caring for people and places	X	X			X	
• Tending the engaged research process, teams and partners (sometimes in unrelated aspects)	X	X	X		X	X
• Deliberate learning through observation, seeking out feedback, formal evaluation, ongoing reflection etc.	X					
• Instilling a persistent caring and learning attitude	X	X			X	

2.5.2 Qualities of and interactions among types of transformative labour

The previous section examined what types of transformative labour the TKNs and their partners performed, and this section focuses briefly on the nature and qualities of this often hard-to-see work. Table 4 suggests that different types of transformative labour tend to target some system conditions more than others, thus making each necessary but insufficient by itself. Moreover, when transformative efforts are still in their early iterations, expectations of systems breakthroughs and outwardly visible changes may be unrealistic, or at least should be tempered – an observation with critical implications for evaluation.[15] Such breakthroughs become more likely in more advanced efforts, although contextual conditions can suppress advances for long periods of time (e.g., global economic forces, overwhelming military powers and global environmental changes). The question of scaling transformative efforts will be addressed below.

The work of the TKNs furthermore makes clear that transformative labour is multifaceted, iterative, ongoing and non-linear. It not only varies by type (or category), but also over the course of the transformation process and in intensity. The level of conflict versus harmonious collaboration prevailing at any one time is similarly non-static. Differently put, at times it is antagonistic and confrontational, at other times bridging and unifying. While different types of transformative labour are described above in generalized forms, in practice it is highly situational – and as such attuned to the necessities of the context. Some efforts will be made repeatedly, others just selectively and rarely. Even with deliberate, intentional transformation processes, some tasks may be used proactively, others reactively – and in either case, actors may view

[15] A fuller discussion of the implications of the concept of transformative labour for formal project and programme evaluations is beyond the scope of this report. Suffice it to say, Table 4 is suggestive of a theory of change as well as of the categories of indicators and sub-indicators one might wish to track. More generally, i.e., beyond the specific use for evaluation, the very point of looking for signs of transformative labour and how it affects the conditions that hold systems in place is to make transformation processes more discoverable and traceable. The concept thus opens up important opportunities for funders, evaluators and researchers studying transformations.

their choice as strategic or intuitive without the benefits of a clear path or grand plan. In any event, because transformative labour involves and in fact requires learning, it is highly adaptive, or as others have said before, a matter of 'building the bridge as we walk on it' (Quinn, 2004). Importantly, and mirroring the growing recognition in the wider literature (e.g., Feola et al., 2021; van Oers et al., 2021), the TKNs illustrated how transformative labour is first – or at once – de-constructive (and in conflict-ridden instances even destructive) and innovative, creative, (re)generative and (re)constitutive. It *must* be both, or else the transformation process does not result in new system configurations. As the three TKNs showed, transformative labour aims at multiple levels at once: it transforms situations, but it almost always also transforms the very people involved in and performing it. Clearly, in the TKNs, both researchers and non-academic partners were changed by them (e.g., Temper et al., 2019; Kulundu-Bolus et al., 2020).

2.5.3 Outcomes of transformative labour

As described above, the concept of transformative labour emerged from, and provides a synthetical lens on, the collective work undertaken by the three TKNs. That said, the projects differed in their main emphasis and degree of contributions to understanding different types of transformative labour. Figure 4 is suggestive of these different foci of work, even as each probably touched on each of the six system conditions and performed some of each category of transformative labour.

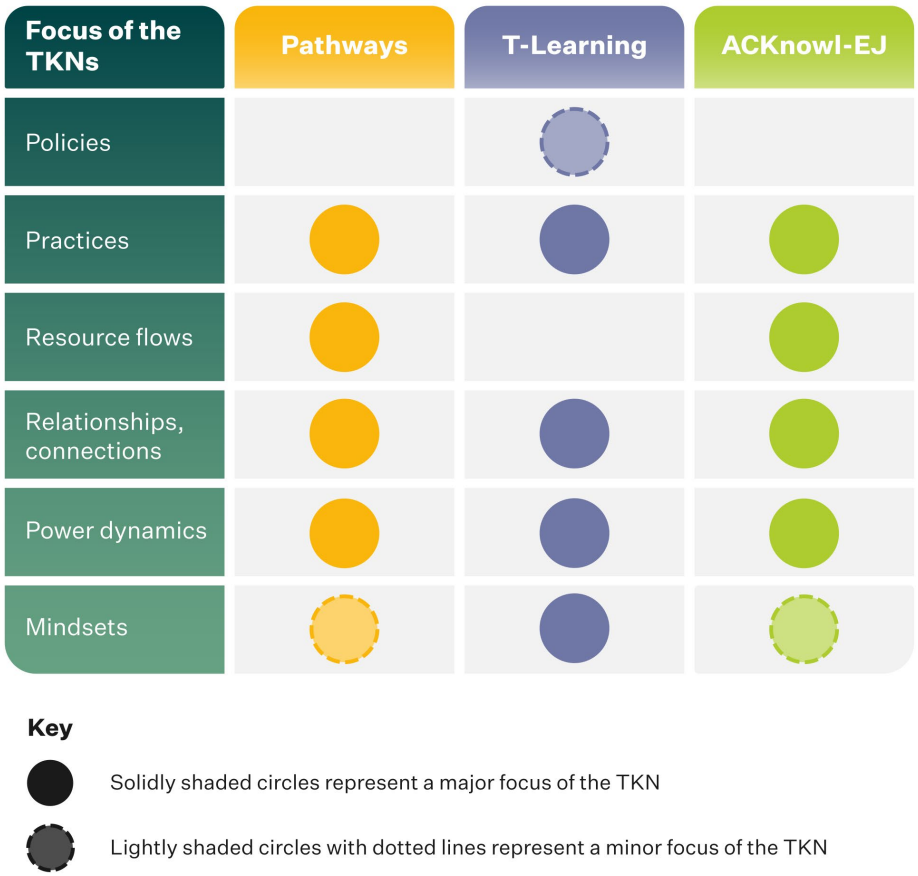


Figure 4: *Key foci of the Transformative Knowledge Networks (TKN) to changing the conditions that hold systems in place based on the 'Six conditions of change' model (see Figure 2).*

What then was achieved with this transformative labour? Here, just a few of these achievements are highlighted, but an effort is made to be specific to each TKN and to go beyond the contributions to scientific understanding, which is important in its own right (see the links to their scientific outputs mentioned in the introductory sections), but by itself does not lead to changes in social and environmental conditions on the ground. Rather, the scientific advances can inform and support additional changes in practice in complex ways. These are detailed below.

ACKnowl-EJ:

Mindsets: The ACKnowl-EJ TKN in its continued work on the EJ Atlas (https://ejatlas.org/), particularly through regional and thematic expansions, has contributed in significant ways to visibilizing the struggles of marginalized communities and peoples for their rights to a healthy, intact environment; for having opportunities to

secure their livelihoods and basic needs for food, water and safe homes; for being heard in the political process and in corporate decisions which decimate their lands and resources; and for the human right to protect their cultures and traditional homelands. Having thousands of visitors a day, being used in teaching and in news reporting, this global coverage of resistance struggles is helping to uplift the voices of the marginalized and exploited and thus counters efforts by governments, industry and corporate media to suppress awareness of pervasive exploitation and violence along with environmental destruction. It also contributes to the empowerment of those who might otherwise feel isolated and ignored. It also has given visibility to a confederated democratic process of governance in India in which local communities and indigenous peoples work to enact a different form of decision-making related to development (e.g., Pathak Broome et al., 2020). Meta-analyses and comparative statistical analyses of large-n EJ Atlas cases were undertaken to better understand the just transition process (Gobby et al., 2022). Project leads reported that the work has inspired young people, in particular [personal communication of TKN participants to author; see also Walter et al. (2020)].

Relationships, connections and power dynamics: Several of the ACKnowl-EJ cases directly engaged in the political struggles they studied by helping to understand conflict and how it can be permanently transformed (Rodríguez and Inturias, 2018; Scheidel et al., 2020; Temper et al., 2020; Walter and Wagner, 2021; Gobby et al., 2022). A Conflict Transformation Framework was developed to learn from transformations brought about by resistance movements, activists, academics and policy-makers that are trying to engage with the root causes of environmental conflicts, but also to enhance these processes of change through helping vulnerable and other key actors conceptualize and strategize conflict transformation. According to project leads, it sparked conversations about how to create solidarity across different interests in other contexts. As discussed before, bringing people to the table and helping voices to be heard that otherwise would not be given space can change consciousness but also political dynamics. An example is ACKnowl-EJ's work in one of the Indian cases where researchers recorded, for the first time, the voices and worldviews of women in the community, which initiated discursive change, challenging the patriarchal decision processes. Work in Turkey led to discussions and rethinking of the concept of development and to a broadening of what people there understood as 'environmental'; this significantly contributed to future visioning, and enabled the movement to evolve from being defensive to taking a more

propositional position (ACKnowl-EJ Final Report, 2019; Follow-up Report 2020, unpublished).

Policies, practices and resource flows: In the course of its work, ACKnowl-EJ developed an Alternatives Transformation Framework (Kalpavriksh, 2017; Kothari et al., 2019) which is all about defining, building capacity for and working towards desired alternatives. It shows how these alternatives to modern development emerge from ecological conflicts and as such help inform others' struggles (Temper et al., 2018a; Pelenc et al., 2019). While the project did not directly result in changes in policies and resource allocations, the TKN documented the changing practices guided by the Alternatives Transformation Framework. Beyond the projects, project leads gave high-level speeches, including at the United Nations (UN) General Assembly and the UN Indigenous Week, to generate political debate about the role of social conflicts over environmental issues. At the TKN level, team members describe how participating in the network not only produced new research tools and practices, but led to significant personal and professional growth through the team's ongoing reflective processes [e.g., on the role of researchers; Temper et al. (2019)]. As the project leads reflected at the conclusion of the project, '[p]erhaps the most important transformations were the relationships, friendships and collaborations formed. The project was hugely successful in creating generative, almost sacred, spaces at each of our project meetings as well as the T2S gatherings and Living Aulas. Our gatherings became spaces for playful experimentation, sharing, debate and intimacy. The sense of community was created that was immensely powerful and is already leading to numerous impacts, future projects and joint initiatives. Our early-career, PhD and activist researchers, as well as our board members often commented that they had never been in an academic space that operated in such a way. The network, relationships and collaborations developed extend far beyond both official and affiliate project members' (ACKnowl-EJ Final Report 2019, unpublished).

T-Learning:

Mindsets: Fundamentally, the T-Learning TKN sought to engage transformation not from a place of social engineering from the top down, but in fostering and enabling open processes of collective learning from the bottom up, so people come to alternative views

and visions of the future on their own. In other words, the group's focus was explicitly on internal change, perspective change, empowerment, shifts in attitude and emotions and on building or strengthening of capacities to enable actors to transform their own situations. Researchers understood the dual need of not only liberating oneself from external systems of extraction, exploitation and oppression, but liberating oneself from the internalized social and cultural norms and mindsets that perpetuate participation in or acquiescence to those harmful systems. It is from this recognition that the important concept of 'transgressive learning' emerged (Lotz-Sisitka et al., 2015; Macintyre et al., 2019, 2020). The creative, performative approach of the 'empatheater' is one of several important examples from this TKN (McGarry, 2018), as is the work of Kulundu with youth becoming change agents (Kulundu, 2018; Kulundu-Bolus et al., 2020).

Relationships, connections and power dynamics: The TKN also made catalytic contributions in changing the diversity of people in scholar activism. T-Learning, in its own right, and in collaboration with ACKnowl-EJ, developed transgressive and transformative practices for scholar activism (T-Learning, 2019). As a result, new networks of scholars and practitioners emerged, e.g., the Coastal Justice Network in the One Ocean Hub (co-led by one of the early-career T-Learning researchers)[16] and the global Transforming Education for Sustainability Network[17]. In addition, the T-Learning research, and its researchers, have contributed significantly to the development of solidarity networks in the case study sites in Ethiopia, Zimbabwe, Colombia, South Africa, Vietnam, Malawi, India and the Netherlands. Specifically, these include the organic farmers networks in Zimbabwe and the bioregional network in Colombia, which is further developing eco-cultural practices. Other networks include water justice and food sovereignty networks in South Africa, youth networks in South Africa and India, the Harm Reduction network in South Africa, the Lekkernassuh food system network in the Netherlands and the scientific farmers network in Vietnam (T-Learning Final Report 2020, unpublished).

Policies, practices and resource flows: The above-mentioned networks that emerged from T-Learning's work constitute important social learning mechanisms for further co-

[16] https://oneoceanhub.org/

[17] https://tesf.network/

learning and linking a diversity of actors around praxis. Thus, the new relationships, mindset changes and praxis cannot easily be separated. However, this TKN's impacts on policies and practices went significantly further, particularly in the educational arena. Regarding policy changes, project leads were invited to participate in UNESCO (United Nations Educational, Scientific and Cultural Organization) consultation meetings to help develop the new framework for the implementation of Education for Sustainable Development (ESD) beyond 2019 (which contributed to the inclusion of a strong focus on transformative learning in the UNESCO ESD for 2030 Roadmap[18]) as well as the Global Environmental Education Partnership.[19] They also participated in planning meetings in Zambia and Zimbabwe for the pilot programme on capacity development for Agenda 2030. Empatheatre[20] T-Learning research engaged national (South African) drug policy on harm reduction, with running tribunals in Parliament to national drug policy events. The T-Learning processes developed through Empatheatre have gone on to contribute to national and international policy processes in marine governance (National Marine Spatial Plan Working Group, Marine Protected Areas Working Group, Small Scale Fisheries policy and the UN Oceans Committee in Human Rights and the Environment) through the follow-on One Ocean Hub project (see link above).

With regard to praxis, the project with youth in India resulted in the development of an App to monitor local educational issues related to Sustainable Development Goal 4 (Mohanty et al., 2019) and another (accessible via https://foodforus.co.za/) in South Africa. T-Learning also impacted educational praxis in numerous ways: researchers provided input to curriculum development at the university and agricultural ministry levels (T-Learning Final Report, 2020, unpublished). The network developed several innovative learning tools (available in the open-source archive of the project), which contribute to knowledge commons pedagogies (e.g., living aulas, queer eco-pedagogies, political rigour, tiny books and the 'suitably strange' practice). In addition, the T-Learning community produced several courses, training courses, summer schools, workshops and educational resources (e.g., the Changing Practices Course in

[18] https://unesdoc.unesco.org/ark:/48223/pf0000374802.locale=en

[19] https://thegeep.org/

[20] https://www.empatheatre.com/

South Africa[21] working with Water Activists, or the Empatheatre/STAND Summer School providing training in Empatheatre methodology[22]). The Sustainability Starts with Teachers[23] project spread across South Africa and beyond. The Colombia Action Solidarity Alliance course has similarly expanded the initial work done in the bioregional contexts. Collaborators from the University of Vietnam produced a student book in Vietnamese as learning material for studying environmental sustainable development. A creative practice and participative research short course hosted by the Education Labour Relations Council and the Political Rigour Collage workshop series facilitated by T-Learning and ACKnowl-EJ researchers in five different countries are other courses flowing from the T-Learning research and praxis. The legacy of T-Learning also persists in active methodologies now being used in Colombian regional governance, and in food system policy in Ethiopia.

Finally, regarding research praxis, the 'Tarot paper' (Temper et al., 2018), as well as the TKN's Code of Practice, and T-Learning ethics of care methodologies, pedagogies and theory, are contributing in innovative ways to pioneering a new action research landscape in scholar activism. The above-mentioned One Ocean Hub has taken up these T-Learning ethics in its own Code of Practice,[24] which, in turn, is informing several other scholar activist research networks. Together with ACKnowl-EJ, T-Learning researchers are continuing to further develop practices for political rigour, new theories and resources.

Pathways:

Mindsets: Pathways' work also resulted in change of minds, albeit maybe unintentionally – largely through creating spaces and processes in which people could come together, learn about and from each other, vision alternative futures and then begin to work out together how to get there. As its name implies, the latter was its principal focus, and as such this TKN focused on empowerment and human agency by

[21] https://www.ru.ac.za/changingpractice/

[22] https://www.empatheatre.com/empatheatre-stand-online-summer-school

[23] https://sustainabilityteachers.org/

[24] https://oneoceanhub.org/wp-content/uploads/2023/02/OOH-code-of-practice.pdf

offering processes through which groups could jointly discover feasible steps towards desirable outcomes. While this focus guided each of the cases included in this network, the actual process of how this joint work was carried out differed from case to case. Charli-Joseph's work in Mexico stands out as a case in which a strong shift in thinking (and feeling) emerged from collaborative dialogue. Participants were described as shifting from initially holding blame and negative attitudes towards external 'others' (e.g., the government) to becoming more empathetic and gaining a sense of agency and self-responsibility for the state of the degrading wetlands (Charli-Joseph et al., 2018; Eakin et al., 2019). This shift towards greater empathy proved particularly impactful after the project officially ended, in that project partners checked in on each other during the COVID-19 pandemic (Charli-Joseph, personal communication to author).

Relationships, connections and power dynamics: As in the Mexican case, each of the six cases engaged in what they termed 'transformative space making' to enable and facilitate dialogues among societal partners and the academics in each case (Pereira et al., 2020). Often this involved forming 'unconventional alliances' – whether of values-aligned actors or of values-divergent interests (Marin et al., 2016). In these spaces, participants co-defined (and redefined) the issue in question and in creative ways explored innovative approaches to addressing them (e.g., van Zwanenberg et al., 2018). In the Argentinian case, for example, the project brought together breeders, producers–breeders, agricultural producers, organizations of producers, experimental stations and seed banks. That case, in particular, is a good example of how Pathways participants worked hard to cross differences and divisions. The Indian project, centred around the Gurgaon Water Forum (GWF) similarly worked hard to bring a wide coalition of stakeholders together, and through its persistent work eventually gained influence and wider, even national recognition. For example, the Department of Science and Technology under the Indian Ministry of Science and Technology now recognizes and promotes the GWF as does the Gurgaon Metropolitan Development Authority and Municipal Corporation of Gurugram. Civil society organizations of Gurugram have started collaborating with GWF. Another ripple effect of the project there is the mobilization of a practitioner network (initiated by the Management Development Institute in Gurugram) to help set a new agenda of social welfare in the city. The GWF team has actively contributed in this agenda-setting process and will continue to play a key role in this initiative (PATHWAYS Final Report 2019, unpublished).

Pathways, like the other TKNs, centred and uplifted the voices of those often not heard in mainstream public debate. For example, in the above-described Indian case, the GWF team broadcast a 12-episode radio programme on the problems of urban water management in Gurugram through a community radio called Gurgaon Ki Awaaj in the summer of 2018. Migrant workers living in the city participated in the live discussions during these episodes. In the Kenyan case, which focused on solar energy installations, the project contributed to the establishment of the Africa Research and Impact Network,[25] taking forward some of the knowledge and interactions that were supported as part of the TKN.

Policies, practices and resource flows: Pathways' impacts on policy, practice and resource flows include several notable examples. Foremost is perhaps the Argentinian agriculture-focused case which – when policy change through mainstream channels proved impossible – developed a wholly innovative approach to circumvent powerful agro-industrial seed producers by creating an open-source seed bank for small farmers, including seed licences and the Bioleft digital platform prototype that was designed to allow and promote the register and transfer of open seeds. The project subsequently won multiple grants to launch an ambitious pilot of the collaborative seed breeding initiative and to test Bioleft's set of technical and legal tools and associated social practices.[26] Proving successful, the project eventually garnered attention beyond Argentina: it was competitively chosen to facilitate the implementation of a similar open seeds network in Mexico – work that is now underway.

Interestingly, since then the project lead there has participated in an expert consultation on 'Post-COVID-19 Implications on Collaborative Governance of Genomics Research, Innovation and Genetic Diversity.' The consultation was organized by the Food and Agriculture Organization of the UN and held at the Argentinian National Ministry of Productive Development in 2020. Several meetings with multiple stakeholders concerning seeds and participatory breeding followed. They involved public breeders, public institutions such as the National Institute for Agricultural Technology and the National Institute for Seeds, as well as relevant organizations of farmers and producers

[25] https://www.arin-africa.org/

[26] https://www.bioleft.org/

such as the National Network of Local Governments and Communities Promoting Agroecology and the National Union of Land Workers. These meetings established the first steps towards collaboration.

In the Indian case, the project team reported several policy impacts post-project as well: in 2019, a citizen-led initiative called 'Bolo Gurgaon' was launched in Gurugram. It proposed a Citizens' Charter of Demand for the (then-)upcoming state-level elections. The GWF team played a key role in setting the agenda of this charter, making issues related to urban water management the basis of the charter. Separately, GWF helped mobilize funding for a rainwater harvesting structure to deal with street-level flooding and mosquito problems: its growing recognition led a leading detergent manufacturing company (RSPL Ltd.) to voluntarily come forward and provide funding for the structure in a low-income neighbourhood. In fact, after the successful demonstration of this project, the company requested GWF to help with building similar rainwater harvesting structures at some of their company sites outside the National Capital Region. A final example from that case is from 2020 (two years after the official close of the project), when GWF organized a meeting of activists and practitioners to discuss the work-in-progress of the GWF. The meeting involved invited representatives from the National Capital Region who endorsed the work of GWF. The meeting resulted in extending the scope of GWF's work beyond Gurugram to include parts of the capital region. The COVID-19 lockdown delayed progress, but work there continues.

Policy impacts in the other cases are smaller but still notable: the UK team provided policy briefs on how to localize the food system and make it more resilient to shocks and disruptions.[27] The China-based work led to enhanced appreciation of social science inputs to policy-making, contributed to training in this area,[28] and also contributed to spin-off projects, including research on urban air pollution and just transitions (Shen et al., 2020). In Kenya, the project contributed to academic and policy debates around low-carbon energy access in Africa (Ockwell et al., 2019). Finally, the work in Mexico contributed to the establishment of a new NGO (UMBELA: Transformaciones

[27] https://steps-centre.org/blog/endings-and-beginnings-project-based-work-within-wider-transformations/

[28] http://courses.forhead.org/upload/201811/28/201811280501352386.pdf

Sostenibles[29]), which is currently seeking funding to initiate work on disruptive innovations, transgressive learning, transdisciplinarity and decolonizing research. It builds on the significant methodological advances by the Pathways Network, summarized in the guide to T-Labs (Pathways Network, 2018; Pereira et al., 2021, especially table 4.2).

In summary, as this non-exhaustive list of examples from the TKNs' work shows, the projects had important impacts on the conditions that hold systems in place. That said, each project entered into an ongoing transformative process – or helped initiate one – and over the course of the three-year project became part of that process but did not come to closure on the various transformations. Project teams either exited or found ways to build on the T2S project to continue their work. Greater impact appears to be evident where the work continued, or still continues to date with additional resources (e.g., in Argentina and India).

2.6 How do transformations proceed and how can they be scaled?

2.6.1 The arc of transformations

The TKNs were encouraged – particularly in the four ISC-sponsored cross-TKN meetings and through the programme funder's and programme coordinator's demand for evaluation – to think carefully about their own assumptions about how the transformative processes they were studying progressed, what drove them and how the researchers' own presence and activist–academic interventions influenced them. From this iterative exercise emerged each TKN's theory of change, which led to some of each network's most important theoretical contributions: T-Learning's 'living spirals' framework (Macintyre et al., 2020); ACKnowl-EJ's conflicts transformation framework (Rodríguez and Inturias, 2018); and Pathways' concepts of 'transformative space making' (Marshall et al., 2018), and the use of single, double and triple-loop learning in connection with complexity-aware evaluation (Ely et al., 2022).

[29] https://umbela.org

As mentioned before, the three TKNs engaged in transformative change at a time when it was difficult to tell whether it was in the early, middle or later stage of transformations – a common condition for those in the midst of it. Hindsight and distance, however, may enable detection, particularly of early stages of transformation before they become the societal new normal.[30] What then can be said about how transformation proceeds, what it looks like and who decides over its course? The 26 cases revealed (or rather confirmed) signs of the archetypal arc of transformation that – paradoxically – begins with an ending and ends with a new beginning, and a long and messy 'nowhere land' in between. Each of the TKNs – while unique in its focus – described this common arc of transformations. It begins (or necessarily involves) the ending of the old, unsustainable and unjust system and eventually moves towards the search for, visioning and definition of a new, alternative and more desirable system.

Examples of these endings in the TKNs included the following: the unlearning of existing understandings, attitudes and worldviews; the questioning of various forms of internalized disempowerment and the courageous step of transgressing old beliefs and norms (in T-Learning); and actively resisting violent, extractive activities or – as the case may be – ceasing conflict to engage in a conflict transformation process. It also always seemed to involve becoming conscious of the problem, and its causes – in the Freirean sense, a conscientization from which the liberatory motivation could spring. Grief and grievances prevail in this ending, as well as concerted efforts by the dominant interests to defend the old system (in ACKnowl-EJ). Growing networks of solidarity

[30] That said, maybe only one case (the China case that was part of the Pathways TKN) examined the latter stages of the transformative process, a situation where fundamentally different conditions have been established and the systems in question function in altered, presumably more sustainable ways. In that instance, however, the top-down imposed industrial transition intended to reduce CO2 emissions left some contextual conditions intact. Thus, while 'completed' in one sense, the transformative shift was unfinished in others. Thus it is possible that additional forms of transformative labour may be found in that later stage of the process, including the psycho-social adjustments to the new 'normal' – something that future research will need to establish.

across aligned and divergent interests is critical work to support this ending and build momentum for the work towards the new (in Pathways).

Likewise, the three TKNs offered examples of the innovative work of imagining and working towards these potentially better systems: the early visioning of desirable futures occurred in all three, as did some version of experimenting with or living into the alternatives (especially in ACKnowl-EJ). However, it was also visible in the greater sense of agency and empowerment (e.g., in T-Learning). Likewise in the new alliances of societal actors, whether they brought together academics and practitioners or fostered novel interactions among non-academic actors. Finally, it was evident in the new practices and policy initiatives that emerged, sometimes during the project (e.g., developing prototypes of new mechanisms (legal, technological, social, pedagogical or practical), sometimes only after the official project ended.[31]

Importantly, while project participants visioned desirable futures and explored the first few steps of the path towards their particular versions of sustainability, the endpoint of the transformation was never (and cannot be) really known; it was not achievable through a few decisive interventions. Project coordinators learned that all strategies along the way are partial, requiring all to engage in a constant process of struggle, in which the next steps are discovered, negotiated and defined (Lotz-Sisitka, 2022).[32] The three TKNs focused on and found it more useful (and ethical) to engage in this process from the bottom up, and thus to give all involved a say in its direction. This made the process slow and unpredictable, and regularly involved resistance and conflict.

In short, this often lengthy period between the ending and the beginning is a messy and often quite invisible space. It is maybe hardest to make out, tedious and slow when it involves the difficult internal (personal) transformative work. At other times, the struggles, conflicts and resistance fights appear more visible, when they manifest as the

[31] https://steps-centre.org/blog/endings-and-beginnings-project-based-work-within-wider-transformations/

[32] Stories of Transformations to Sustainability (video) (https://t2sresearch.org/2022/09/28/stories-of-transformations-to-sustainability/), Heila Lotz-Sisitka @ 9:43-10:18).

outer, social reckoning among different interests and factions. In fact, much of the TKNs' work was to visibilize this struggle, and in so doing to bring not only public and political attention to it, but to counteract the sense of isolation and to foster greater solidarity among those involved in these struggles. In this way, capturing a snapshot of this in-between stage is a highly political act.

2.6.2 Scaling out, scaling up and scaling deep

If the eye can be trained on the basic arc of the transformation process, can it also be trained on recognizing how – and aid in helping – small transformative processes become world-changing ones? Can the insights from the local cases be accelerated, applied and scaled so as to lead to large-scale transformations to sustainability? Against the ever-growing urgency of global environmental and social crises, this question of scaling becomes ever more important.

Setting aside for the moment the earlier argument that more transformations may be underway than meet the eye (by way of the difficult-to-see transformative labour), what insights can be gained then from the work of the TKNs on scaling? Importantly, none of the TKNs explicitly studied the potential for or process of scaling, but some discussed implications for scaling (e.g., Ely et al., 2022). Thus, the observations here are by inference from the observed behaviour more than from their publications. The accomplishments detailed above began to hint at this. Using the distinction of three types of 'scaling social innovations [required] to achieve systemic impacts' of Moore et al. (2015), this section explores what could be learned from the TKNs on these questions.

First, the TKNs engaged in 'scaling out,' i.e., the replication of their efforts to spread what worked successfully elsewhere.[33] Pathways' T-Labs methodology, and the case of developing open-source seed banks and nurturing the networks of relevant actors first in Argentina, and then in Mexico, are prominent examples (Ely et al., 2022). Adding some 300 case examples to the EJ Atlas over the course of the ACKnowl-EJ project

[33] By 'scaling out,' Moore et al. (2015) meant the situation 'where an organisation attempts to affect more people and cover a larger geographic area through replication and diffusion' (p. 71).

(using the same template) is another. Similarly, using the educational resources and curricula developed by T-Learning in one place to another constitutes another example. Importantly, more than just replicating or applying a successful strategy in more cases, the networking aspect – embedded in the foundation of this research programme – contributed to this effect. By design the TKNs involved multiple cases in which a similar issue was examined, and learning enhanced from the intra-TKN reflection practices. This learning was further enhanced by the programme efforts to foster and support cross-TKN exchange and collaboration.

Second, the TKNs also used the 'scaling up' strategy by making higher-level interventions aimed at instituting a positive change – one that was first successfully piloted at a lower level (e.g., at the community scale) – for a broader set of constituents (e.g., at the regional or national scale).[34] In each TKN, project and/or network leads made efforts to bring their learning into national or international policy dialogues and design processes: T-Learning, for example, brought the notion of transgressive learning into UNESCO's educational efforts directed at Agenda 2030; similarly, in the Pathways Network, the Indian GWF's work at the neighbourhood level expanded to become foundational to a local policy charter and gained national recognition; and ACKnowl-EJ addressed the UN General Assembly and UN Indigenous Week to foster a political debate about the role of ecological conflicts – while this did not immediately turn into policy, it is another example of reaching for a higher level of governance to broaden one's impact with insights gained from local cases. In general, this type of scaling was opportunistic and unplanned: the TKNs responded readily to emergent opportunities if and when they arose – either serendipitously or as a result of the local successes.

[34] Moore et al. (2015) define 'scaling up' essentially as institutional changes (p. 74), 'where an organisation aims to affect everybody who is in need of the social innovation they offer, or […] to address the broader institutional or systemic roots of a problem' (p. 71).

Finally, all TKNs engaged in 'scaling deep,' i.e., in efforts to affect the deepest drivers of a system, namely what was earlier described as the mindset and relationship dynamics[35] (see descriptions above). In fact, one might argue that the greatest attention was given to this form of scaling: it was written into the very methodologies used by each network.

2.6.3 Scaling as transformative labour

This reflection on the TKNs' scaling efforts then brings us back to the difficulty of seeing transformative change, and implies yet another type of transformative labour (Figure 5). First, scaling out must be detected and made visible by horizon-scanning, tracking, mapping and communicating horizontally how locally successful transformative efforts are spreading. It can be exhilarating when insights, ideas and knowledge are shared, but also often requires finding additional resources to enable the distribution and application in more locations. Stirling (ISC, 2022, 16:28–17:47) used the metaphor of 'murmuration' to visualize the spread of many small transformative efforts all across the world, which offers a hopeful image and also hints at the transformative labour of staying alert and attentive, aligning with others at short notice for greater collective impact, i.e., potentially giving up some measure of control over the larger process. While flocks of birds may be 'networked' invisibly, sensing instinctively the twists and turns of other birds, human transformative efforts appear to require more conscious, effortful networking and communication in all directions, to recognize and demonstrate the movement afoot.

[35] Moore et al. (2015) defined 'scaling deep' as 'the notion that durable change has been achieved only when people's hearts and minds, their values and cultural practices, and the quality of relationships they have, are transformed' (p. 74).

***Figure 5**: Updated types of transformative labour in dynamic relationship with each other*

Scaling up, on the other hand, has a better chance of being seen (and politically recognized), simply because it happens in higher, more visible public arenas, which already garner frequent media attention. Still, it must be either strategically planned for and worked towards, or else demands that actors be on high alert for, and responsive to, emergent opportunities. For researchers and most advocates (i.e., all besides paid lobbyists), this typically involves unplanned-for and uncompensated work. Interestingly, it complements the 'bottom-up' intent of scaling out and scaling deep with a touch of 'top-down' intervention. To achieve it, political advocacy, coalition building and other political organizing strategies may be needed – not always the comfort zone of academics, and thus often involving additional partnerships.

Finally, scaling deep demands that those involved grow 'comfort with discomfort' to stand in the tension of contradictions, confront the legacies of harmful (economic, cultural or social) systems and develop a reflexive practice that can help to 'loosen' it. It

may be the most difficult transformative labour as it requires unlearning not just pre-existing knowledge, but modes of thinking (e.g., linear thought), habits of mind and cultural truisms, and even confronting the limits of language. It can also involve working across differences, truth-telling, reconciliation, forgiveness, healing trauma and other challenging emotional work. Possibly, and the most challenging, it can demand that those involved subsist for long periods of time on the 'invisible fruit' of their labour, i.e., they must find a deeper motivation than outwardly visible success.

2.7 What is the role of science and of scientists in transformations to sustainability?

The discussion above has made clear that transformations to sustainability are deeply, and fundamentally, political processes, and that transformative labour, as system-transcending labour, is therefore – ultimately – also and inescapably political. This raises the question of whether science is of any use in this context, and if so, what kind of science? In fact, conventional (Enlightenment) science may be deeply uncomfortable in this place, but the activist–scholars involved in the T2S programme did dare to step into this space – with their eyes wide open. Explicitly anchored in a liberal and liberatory orientation (see their definitions of 'transformation'), the TKNs chose to undertake not only transdisciplinary, but transformative science. They walked the tightrope of using the tools of science to create deeper understanding of the situations at hand, but also to question the very nature, role and forms of science.

Out of this critical reflection on science amidst, and participating in, the difficult processes of transformation emerged the novel concept of 'political rigour' (Temper et al., 2019) to complement the already well-established notion of scientific rigour. McGarry (of the T-Learning team) created a series of artful depictions of several archetypal roles that scientists might play in this politically rigorous, conscious way in the transformations process (McGarry, 2018; Temper et al., 2019).

Through their own rigorous reflective practice – within and across the respective networks – the TKNs came to understand the importance but also the limits of what science and scientists can do to aid transformations. Of course, traditional scientific expertise can be a useful and authoritative strategic tool in political struggles: it can help

understand the dangers of a situation and help suggest pathways out of it; it can provide information and data on good practices; it can help integrate many different perspectives (e.g., diverse, indigenous and scientific), sort well-established knowledge from less well-established understanding with clear delineation of pervasive uncertainties and present relevant insights in context-sensitive, contextually-relevant and decision-relevant ways.

However, the understanding of science's and scientists' role in transformations to sustainability is at once more humble and bolder than these conventional ideas of science's influence in the public and policy process. Traditional kinds of inputs from science (data, knowledge, models and tools) are not sufficient to bring about transformative change. At least as powerful, and maybe more impactful, has been the full spectrum of transformative labour described above. Often, in these projects, this meant stepping back from presuming to be the one authoritative source of knowledge and instead uplifting the voices of those not previously heard. In other words, the corrective, decolonizing and healing work of science in the transformation process is to play more of a facilitative and caring role, making space for others rather than only for itself. With such a clear ethic of care and normative commitment to multidimensional sustainability guiding its work, transdisciplinary science can become transformative itself.

Paradoxically, the scientists in the TKNs were also called to step forward more courageously into the midst of tension, conflict and policy debates, if they wished to make any difference in the political process. This meant actively naming and engaging in the power struggles at hand, knowing when it is more impactful to take sides or when it is better to remain the neutral arbiter or facilitator of difficult dialogues, helping and becoming part of powerful alliances against life-destroying forces, increasing the legitimacy of co-created knowledge, fostering a skilled readiness and political will and courage among actors and creating the conditions for policy and political shifts when they emerged.

In the end, transformative labour appears to exert its effects reflexively – once on the situation in question and simultaneously back on the actors involved in it, including on the scientists engaged in or facilitating the transdisciplinary, transformative projects

themselves. In short, one might posit that if science does not transform itself in the process of transformative change in which it wishes to play a role, it simply will not play the most powerful role it can play. Practically speaking, this means that science and the institutions that fund and manage it must change: they need to consider the value of transformative labour, to make space for it and to train for, reward and support it – a tremendous struggle in the face of – and against – the trends of privatization and commodification in higher education and research.

3. Conclusions and ways forward

In summary, this report aimed to synthesize the work of three TKNs. It argued that transformations to sustainability – understood as the deep work that changes the conditions that hold unsustainable, unjust and often violent and extractive systems in place – for long periods of time takes place in difficult-to-see places. The three TKNs worked in these spaces, performing a variety of necessary forms of labour, which collectively were introduced as 'transformative labour.' Driven and underlain by care and learning, this transformative labour involves assessing, understanding, naming and visibilizing the unsustainable and unjust conditions and engaging with affected communities to create transformative spaces in which positive alternatives can be explored, a sense of agency and power can be fostered, and those involved can begin to enact steps towards these alternative futures. Over time, this transformative labour also involves maintaining momentum, tending the relationships and finding ways to scale the work begun at the local level (scaling up, out or deep).

The concept of transformative labour emerged from 26 case studies across the world; it found great resonance with the twelve (multicase) international research projects funded in the second generation of the Transformations to Sustainability programme.[36] However, future research should further validate and refine the concept in completely independent projects and contexts.

[36] https://t2sresearch.org/projects/

As mentioned above, there are several possible directions to do so:

- Future research should examine in greater depth either more advanced transformative processes (to the extent it is possible to identify them as such), or else study historical cases of transformative change to identify additional forms of transformative labour.
- A second line of research should examine whether, in what ways and to what extent, the concept of transformative labour also applies to leaders in superior positions working to 'force,' manage or support transformative shifts from the top down, or to those fellow members of society who must – in one way or another – come along with the transformative changes unfolding, even if they are not working to set them in motion.
- An additional avenue for future research may be to examine how 'transformative labour' might fit into or complement the wide range of liberatory theories and approaches (e.g., neo-Marxian, feminist, liberation pedagogies, psychologies and theologies) engaged in critiques of science and other institutions (including markets and government arrangements).

The three TKNs have not exhaustively researched the transformation process – which, of course, is the project of a whole generation of researchers now emerging. Much remains to be learned about how the political will of high-level leaders can be harnessed for the urgent and necessary shifts to sustainability, how to durably achieve shifts in power, particularly for those who – too long – have been in marginalized positions. The work on conflict, empowerment and transformative agency by the three TKNs are fruitful places from which to step off into this all-important work for both researchers and actors labouring diligently, patiently, passionately, strategically and ethically for a world in which life, dignity and justice are still possible.

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