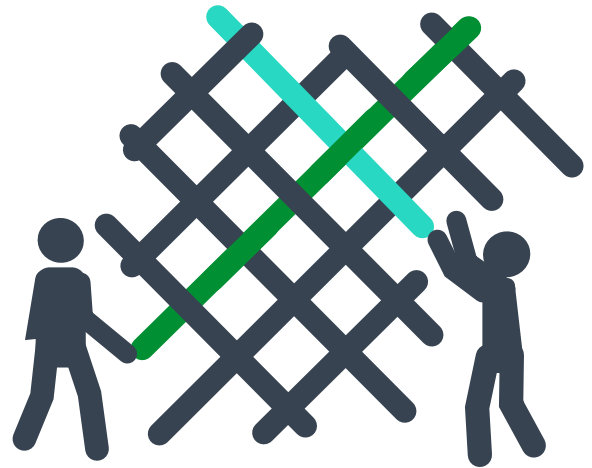


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Transdisciplinarity: Breaking down disciplinary and academic barriers

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ABSTRACT

Transdisciplinarity emphasises the involvement of non-academics (e.g. policymakers, practitioners, citizens) in knowledge production. It is a type of knowledge production grounded in real-world perspectives and problem framing, and thus, is considered especially important when dealing with complex societal problems, such as climate change. Social Sciences and Humanities (SSH) contribute a conceptual and empirical understanding of transdisciplinarity, giving important insight into future transdisciplinary research design and implementation. This literature brief presents some of the main contributions of SSH research to energy, climate and mobility, concluding with some takeaways for EU policymakers, stakeholders and businesses, and the SSH CENTRE.

SUMMARY

- Transdisciplinarity is a form of knowledge production that transcends disciplinary and academic boundaries.
- Transdisciplinary research contributes to solving complex societal problems like climate change and finding just solutions for sustainability transitions.
- SSH can facilitate transdisciplinary work through a broad knowledge of methods tailored to a variety of agendas, actors, and cultural/political contexts.
- SSH perspectives can serve to foster mutual understanding between societal actors and scientists/technical expertise.
- SSH scholars can be well suited to identify and consequently adapt power imbalances and exclusion of actors and views in transdisciplinary processes.
- SSH's contribution to transdisciplinary work in the areas of energy, climate and mobility needs to be better recognised in all EU research funding calls that seek to address sustainability challenges facing society.

KEY DEFINITIONS

Transdisciplinarity:

“a mode of research that integrates both academic researchers from unrelated disciplines – including natural sciences and SSH - and non-academic participants to achieve a common goal, involving the creation of new knowledge and theory” [1, p.9]

“a distinctive form of interdisciplinarity, with an active role for non-academic stakeholders and/or wider publics as co-designers and perhaps co-producers” [2, p.79]

“a reflexive, integrative, method-driven scientific principle aiming at the solution or transition of societal problems and concurrently of related scientific problems by differentiating and integrating knowledge from various scientific and societal bodies of knowledge” [3, p.26-7].

Introduction

Transdisciplinarity calls for a new type of knowledge production that transcends disciplinary and institutional boundaries. It is recognised as a form of knowledge production that breaks down hierarchies between academic and non-academic knowledges and calls for various actors – from academia, industry, public sector and civil society – to work together. Such a breakdown of barriers is crucial to solving **complex social problems and ‘grand societal challenges’** such as climate change [2, 4].

Transdisciplinarity is thus an **important strategy for meeting sustainability transition goals** within energy, climate and mobility. Although transdisciplinarity is often not explicitly referenced, EU policy has increasingly institutionalised public participation in knowledge production and innovation [5]. For example, the EU’s move towards mission-oriented research and innovation (R&I), such as the Climate-Neutral and Smart Cities, signals a push towards transdisciplinarity to reach ambitious policy interventions. This often results in cooperation between universities, industry, government/administration, and citizens.

SSH research contributes to the theoretical and practical understanding of transdisciplinarity [6]. Conceptually, scholars shed light on the difference with other forms of knowledge production, such as traditional disciplines and multi- and interdisciplinary knowledge. From empirical studies of practices, SSH also points to many opportunities and challenges connected to the organisation and effectiveness of transdisciplinarity. Insights from this research can help **facilitate transdisciplinary work, manage expectations of the benefits of transdisciplinarity, and avoid common pitfalls.**

This literature brief outlines some of the main features of transdisciplinarity and the different ways it is implemented today. Special attention is put on how transdisciplinarity can benefit sustainable transitions in various sectors. The insights presented are informed by existing academic literature and interviews with two expert academics¹.

Current Understandings

Significant Findings to Date

As can be seen above, transdisciplinarity can be defined in several different ways. Although there is no unified definition of the term, it is important not to confuse transdisciplinarity with the associated terms such as multi- and interdisciplinarity. SSH scholars clarify the most important differences between different forms of knowledge production. Klein’s [7] taxonomy offers a helpful distinction:

1. multidisciplinary research refers to knowledge production where different disciplines work together but keep their identities,
2. interdisciplinarity research tries to integrate different disciplines and approaches to answering questions while

3. transdisciplinary research tries to overcome disciplinary boundaries altogether by integrating disciplines.

Multi- and interdisciplinary research is centred on collaboration between different disciplinary fields, while transdisciplinary research tries to overcome disciplinary boundaries altogether, including that between academics and non-academic knowledge.

SSH scholarship has a long-standing interest in how transdisciplinarity works in practice. The main discussions revolve around scholarly engagement in transdisciplinary research, design and implementation of transdisciplinary research, and the effects of transdisciplinarity.

One central debate focuses on the **risks connected to participating in transdisciplinary research.** When working transdisciplinarily, the goal of knowledge production is usually to solve particular problems (e.g. foster system change) and less on scientific publications. Newig et al. [8] found that academic performance is lower in projects with non-academic actor involvement. This creates challenges for academics who need to stay on a career path, especially for early career researchers [9]. Publishing is problematic for various reasons – participants work on different timeframes (e.g. policy cycle vs review processes), or have very other interests (e.g. artists and industry as opposed to academics). ‘True’ transdisciplinary outputs are thus difficult to attain, whilst publishing channels are still dominated by disciplinary perspectives, making alternative approaches more challenging [10].

A second ongoing discussion is on the **impact of transdisciplinarity.** Scholars argue that it is challenging to assess clear causal effects from transdisciplinary research [3, 11, 12]. Part of the challenge is that societal transformations take a long time [13]. One of the significant impacts of transdisciplinarity is the shift in perspective among participants, which can be hard to trace in their future work casually. Still, SSH literature offers suggestions for how the effectiveness of transdisciplinarity can be strengthened, e.g. through careful project design, which reduces trade-offs between academic and societal outcomes [8] or reflexive approach which accounts for the variety of dynamics among actors [14]. Overall, however, scholars agree that the impact depends on the implementation.

A third debate concerns **the best way to organise transdisciplinary work.** SSH scholars identify many problems with transdisciplinary work. One prevalent theme in the literature is power imbalances between disciplines or academic/business/government actors versus citizens. In energy-related projects, for instance, the engineering and technical expertise is allocated much more resources than SSH [15], while social scientific evidence is less valued [16] and has been shown to be excluded in reports and other project outputs [6]. Certain SSH disciplines, especially Economics, are also traditionally more practically oriented and thus more easily included in projects aimed at, for instance, sustainable mobility as opposed to more critical SSH disciplines [7]. This can create an imbalance in the type of SSH disciplines invited into transdisciplinary collaborations. It is also well documented that academics can control the process of engaging non-academics in a way that may be exclusionary for specific groups or limit meaningful input on the definition of problem and processes as a whole [18, 19]. The most significant contributions of SSH focus on methods for doing transdisciplinarity, which can overcome some of these problems and foster

¹ Interviews were conducted in November–December 2022.



meaningful collaboration. We look closer at these methods in the following section.

Emerging Practices

Collaboration across and beyond disciplines is at the core of transdisciplinarity. This means that actors with very different backgrounds, interests, and forms of reasoning work together. Such collaborations can take many different shapes.

Increasingly, Research & Innovation (R&I) calls for transdisciplinary collaborations. Such collaborations are often organised through research and/or development projects which include representatives from academia, industry and government, or increasingly, also through more institutionalised research centres. For instance, Centres for Environment-friendly Energy Research (FME) in Norway or the Energy Research Centre in the UK aim to bring together state representatives, industry and interdisciplinary research groups. However, transdisciplinary work is often only a segment of more extensive research and development initiatives and is thus conducted in particular situations and time periods.

Notwithstanding the form of organisation, a valuable framework for transdisciplinary practices is divided into **three key phases** [3, adapted from various authors, p.28]:

1. collaborative problem framing and team building,
2. co-creation of solution-oriented and transferrable knowledge through collaborative research,
3. (re-)integrating and applying the co-created knowledge.

SSH scholarship offers many methods for operationalising these ideal transdisciplinary phases into concrete practices. These insights build on long-standing learning, which has shown how collaboration often falls short of its ambition, remaining a one-directional or only superficial character and not giving different groups sufficient influence on the outcome [19, 20].

One of the most common **methodologies to facilitate transdisciplinarity is co-creation** [5]. Although co-creation is an umbrella term for a wide spectre of methods, its main benefit for transdisciplinarity is that it is well suited to gather a wide diversity of actors [19] and give them equal opportunity to influence the outcomes of the research/activity [20].

Often, co-creation is practised through workshops as brainstorming activities. This can be done through traditional methods such as table discussions, mind-maps, forums etc. However, the ability for workshops to overcome power imbalances in groups, allow for equal influence on framing problems, and create collective solutions often remains unknown.

Some recent literature, however, highlights the **effectiveness of more creative methods**. One example is storytelling. Storytelling is a method to generate collective understanding and overcome linear knowledge sharing. Mourik et al. [21] used storytelling in workshops across 17 countries and argue that it helped the participants understand problems from other points of view and build new relations and collective future visions for energy policy. Cinderby et al. [22] is another recent example where creative methods as a form of co-design were used to study sustainable mobility solutions in East African cities. They conducted various real world experiments such as street events, creative play, urban dialogues,

street art, and pop-up displays with mobility users, transport operators, businesses, artists and academics, which allowed for the voice of marginalised groups to be heard, leading to a more equitable definition of problems and decision making procedure of new and alternative mobility solutions. There are also entire projects which are designed around arts-based and creative social science methods. One good example is the EU Horizon 2020 funded The CreaTures project (Creative Practices for Transformational Futures), where they implemented many different creative practices as means for transformational eco-social change. They also developed a transdisciplinary framework designed for researchers, policy makers, creative practitioners, and funders. Creative and artistic approaches are thus highlighted as avenues for **overcoming traditional forms of communication** necessary for transdisciplinarity and as means to carve new pathways towards sustainability.

SSH scholars still identify **many hindrances and challenges that have been identified to facilitate good transdisciplinary processes**. For example, the fears, histories, and traditions of the participants can make collaboration difficult [21]. Conflict and deadlocks can also emerge, potentially slowing down energy transitions [23]. Participants can also have limited awareness of and unequal interest in the problems discussed and little opportunity to participate in projects over time [3]. These are only a few examples of why careful consideration and well-trained facilitators are necessary for designing and facilitating transdisciplinarity [21]. **Avoiding such challenges, however, can create unjust and unsustainable solutions** [24].

SSH's ability to develop understandings of group dynamics, cultures, and knowledge production processes makes it well suited to both lead transdisciplinary processes, and, of course, contribute directly with its insights. However, it is also important to be aware that **the insights developed by SSH scholars can be misused to facilitate the acceptance of particular solutions**, e.g. smart meters, wind turbines or autonomous vehicles [25]. For example, projects may draw upon and favour particular SSH perspectives, such as mainstream Economics to support technologically driven projects. Likewise, SSH scholars may be expected to convince lay participants of the benefits of proposed solutions, rather than providing an opportunity for lay participants to develop solutions. Thus, the role of SSH needs to be strengthened as both a broad disciplinary field and as a facilitator of transdisciplinarity.

Future SSH Priorities

SSH has an important role in future transdisciplinary research. First, SSH **needs to play a more central role in energy, climate and mobility research** which is currently dominated by STEM perspectives. Moreover, it is necessary to recognise the broad contribution of SSH beyond the disciplines of Economics and Psychology. For example, in mobility research, Humanities perspectives are significantly under-represented [17].

Second, SSH should be used to **understand best practices** in transdisciplinary processes further. SSH scholars are uniquely qualified to study ground-level experiences and consequences of doing transdisciplinarity, and what this means for R&I professionals (and their working cultures) and



the solutions and policy evidence created. For instance, SSH can contribute to a better understanding of the (longitudinal) social learning in transdisciplinary practices and its effects on sustainability transitions [26].

Third, SSH scholars are also well-suited as **facilitators of the transdisciplinary process**. This requires training and a specialised understanding of transdisciplinary dynamics, which SSH scholars are well versed in.

Lastly, SSH disciplines also need to value transdisciplinary research more in their appraisal of scholars and careers. Academic careers are still dominated by evaluation procedures favouring narrow disciplinary publications and achievements. For SSH to have a prominent role in future **transdisciplinary energy, climate and mobility research, it must also be acknowledged as a valued contribution to the sciences and its development**.

Takeaways

Takeaways for the European Commission

- In seeking collaboration between disciplines and with public and private actors in energy, climate and mobility research call, the European Commission (EC) should seek the representation of a variety of SSH disciplines (beyond Economics and Psychology).
- When the EC is devising calls and budgets, the division of resources should be based on equality in partnership to strive for a common purpose.
- When developing policy, the EC should be aware of the strength and weaknesses of different forms of knowledge production – from disciplinary, interdisciplinary, and transdisciplinary – to strategically design projects which can have the most impact.
- Research calls should be designed in a way that can provide actors in academia with the opportunity to further their academic career (scholarly contributions) as well as coproducing solutions across traditional academic/disciplinary boundaries.

Takeaways for Stakeholders and Businesses

- Transdisciplinary research requires stakeholders and businesses to be prepared to work towards common objectives together with academia and laypersons.
- Stakeholders and businesses need to start the transdisciplinary process early to include others in the framing of problems and solutions.
- Stakeholders and businesses need to recognise the contribution of a broad set of SSH disciplines in developing sustainability solutions and not merely convincing publics of their value.

Takeaways for the SSH CENTRE project

- When designing transdisciplinary teams and activities (WP2, WP3, T3.3, WP4) organisers need keep in mind

the representation of participants with different profiles and give ample room for them to influence the framing of the agenda in the task.

- When conducting transdisciplinary processes (WP2, WP3, WP4), organisers need to be reflexive of the methods used for implementation and give room for collaborative outcomes that are not purely steered by project objectives.
- In evaluating the project (WP5), the strengths, weaknesses and other lessons from the transdisciplinary process should be included in the reporting.

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