



Core design principles for just sustainability transitions: a framework for transformative research

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Abstract

Transformative research is crucial for orienting, scaling, and accelerating just sustainability transitions (JISTRAs), which have become a growing priority in sustainability science and policy. This paper addresses the challenge of organizing productive transformative research initiatives by adapting Elinor Ostrom's Core Design Principles (CDPs) for organizing sustainable collective action. We present a modular framework that illustrates how the CDPs can be applied in the context of transformative research initiatives to support JISTRAs. In particular, we argue that CDPs can function as boundary objects, fostering productive dialog between different perspectives. This framework offers both theoretical contributions to the field and practical guidance for researchers and practitioners engaged in transformative research initiatives on the ground. By bridging theory and practice, our work aims to make research efforts driving JISTRAs more productive.

Keywords Core design principles · Just sustainability transitions · Transformative research

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Introduction

Transformative research is a growing research movement that is gaining prominence in both sustainability science and policy (Horcea-Milcu et al. 2024; Schneidewind et al. 2016; Wittmayer et al. 2021) as an essential lever for advancing *just sustainability transitions* (JISTRAs; Avelino et al. 2024; European Environment Agency 2024). Despite its importance, organizing productive¹ *transformative research initiatives* (TRIs) remains a significant challenge. While existing literature has made significant strides in developing recommendations for conducting TRIs (e.g., Caniglia et al. 2023; Fazey et al. 2018; Hölscher et al. 2021; Scholz et al. 2024; Wittmayer et al. 2024), the literature also continues to highlight the complexity of TRIs and the challenges associated with implementing them in practice (see, for example, Caniglia et al. 2023; Hölscher et al. 2021; Horcea-Milcu

¹ We use the term productive here in the general sense of “effective in bringing about” or “having the quality or power of producing” (Merriam-Webster, 2025) to emphasize the ambition of our work to help anticipate and reduce *unproductive* friction when organizing TRIs. We recognize that friction is inevitable in transformative work, and we are not suggesting that consensus is always possible or even desirable. Rather, our framework is designed to help transformative researchers: (1) foster constructive tensions that drive progress toward shared goals, and (2) more effectively anticipate and manage unproductive conflicts that impede progress.

et al. 2024; Kump et al. 2023; Wijsman and Berbés-Blázquez 2022; Wittmayer et al. 2024).

We argue that the persistence of these practical challenges stems, at least in part, from the *essentially contested* nature (Gallie 1956) of the concepts of justice and sustainability and the diverse perspectives and needs of those involved in and affected by JUSTRAs (Schlaile et al. 2017). The inherent tension between justice and sustainability ideals (Ciplet and Harrison 2020) and the complex interplay of various actors with sometimes seemingly irreconcilable interests (Patterson et al. 2024) create a complex and unique environment that is inherently rich in potential and fraught with obstacles. Therefore, rather than expecting to find clear, ready-made answers about how to organize productive TRIs, we should strive to develop and support more reflexive practices for navigating TRIs (see Caniglia et al. 2023; Kaljonen et al. 2024; Lazurko et al. 2025; Wittmayer et al. 2024).

Our work contributes to this goal by adapting Elinor Ostrom's evidence-based *Core Design Principles* (CDPs) for organizing sustainable collective action (Ostrom 2010; Wilson et al. 2013) to the context of TRIs. We propose that the CDPs can serve as a modular framework for organizing (practical knowledge about) TRIs.² In particular, we argue that the CDPs can be used as a holistic but manageable set of *boundary objects* (Star 2010; Star and Griesemer 1989) that a wide range of stakeholders in TRIs can work productively with, even if they disagree about the goals of a TRI or some of the actions to be taken (e.g., Franco-Torres et al. 2020; Janssen et al. 2023; Steger et al. 2018). In this sense, the CDPs are not and can never be a panacea for organizing “successful” TRIs. Rather, they should be seen as robust reference points that can help transformative researchers and their partners better navigate the complexities of organizing productive TRIs.

We present a modular framework that operationalizes the CDPs in the context of TRIs. For each CDP, our framework provides key planning and assessment questions, identifies potential sources of tensions, suggests guiding questions for reflexive practice, and offers examples of useful tools and resources. The framework is modular in the sense that both the content for each CDP and the list of principles itself should be adapted to specific TRI contexts and refined over time. This set of considerations helps those involved in organizing TRIs orient themselves, as well as connect and bridge diverse parties in specific settings, creating a foundation for more productive TRIs.

² We use the term framework here in the sense of a basic conceptual structure that can help us organize our thinking in relation to a particular situation (see Ison 2017). In our framework, the CDPs serve two functions simultaneously. First, the content of each CDP suggests a key concern that transformative researchers should consider when (co-)designing and (co-)organizing TRIs. Second, the set of CDPs can serve as an organizing framework for *additional* insights, methods, techniques, and tools (i.e., practical knowledge) that can be helpful in organizing TRIs.

Our findings extend existing knowledge in several ways. On the theoretical side, we contribute to the field of sustainability science by providing a novel application of Ostrom's CDPs in the context of TRIs, thus strengthening the bridge between collective action theory and sustainability science. On the practical side, we provide a modular framework for organizing TRIs that can support the orientation, planning, and reflection of transformative researchers and practitioners.

By bridging theory and practice, our work aims to make TRIs more productive and is, thus, particularly valuable for actors managing or engaging in such initiatives. It also seeks to benefit those at the margins of TRIs by advocating for more reflexive research practices and, in particular, co-creative processes that broaden the range of participants and viewpoints included in TRIs and ideally involve all those affected by them. Our framework also provides helpful directions for context-sensitive evaluations of TRIs. This aspect may be of particular interest to science funders and policymakers, as it provides a basis for assessing the potential and progress of TRIs.

Theoretical background and related work

Transformative research

There is a growing recognition that traditional research approaches may be insufficient for catalyzing the profound societal changes needed to address the persistent global problems we face. This realization has given rise to *transformative research*, an emerging research orientation that aims to bridge the gap between knowledge production and societal transformation (Hölscher et al. 2021; Horcea-Milcu et al. 2024; Schneidewind et al. 2016; Wittmayer et al. 2021).³ As such, transformative research goes beyond merely describing or analyzing problems and strives to directly engage in change processes to co-produce more just and sustainable ways of working, living, and being (Horcea-Milcu et al. 2024). The transformative research orientation closely aligns with and extends the goals of sustainability science, which aims to generate actionable knowledge to address complex socio-ecological challenges (Kates et al. 2001), with an explicit focus on action.

At its core, transformative research is generally characterized by several key features (cf. Horcea-Milcu et al. 2024;

³ We refer to transformative research as a research orientation to emphasize that we do not consider transformative research to be a specific research method. Rather, we use it as an umbrella term for all research that seeks to actively participate in just sustainability transitions (see Wittmayer et al. 2021). In particular, we point to Wittmayer et al. (2021) for a succinct discussion of the research traditions transformative research draws on (e.g., mode-2 knowledge production, post-normal science, transdisciplinarity, phronetic social science, participatory action research, and knowledge co-production).

Schneidewind et al. 2016; Wittmayer et al. 2021). First, it adopts a *systemic perspective*, recognizing the interconnected nature of societal and environmental issues and our own entanglement (as researchers) with them (Fazey et al. 2018; Ison 2017). Second, it embraces *transdisciplinarity* (Hirsch Hadorn et al. 2008), integrating knowledge from various academic disciplines and non-academic actors (Scholz et al. 2024). Third, it is inherently *normative* and explicitly oriented toward sustainability and social justice (Avelino et al. 2024). Fourth, it is *iterative*, emphasizing collaborative processes of co-creation that involve diverse actors in the research process (Caniglia et al. 2023) and seek to increase the *reflexivity* (van Mierlo et al. 2010) of these participants over time.

The goals and outcomes of transformative research extend beyond traditional academic outputs. While it still aims to produce rigorous scientific knowledge, it also seeks to co-create transformative action by (i) building capacity among relevant parties for systemic thinking and collaborative problem-solving; (ii) catalyzing social learning processes that can lead to shifts in values, beliefs, and behaviors; and (iii) fostering networks and partnerships that can sustain the long-term change efforts needed to address persistent societal challenges (cf. Hölscher et al. 2021; Horcea-Milcu et al. 2024; Schneidewind et al. 2016; Scholz et al. 2024; Wittmayer et al. 2021).

Transformative research is particularly relevant in the context of sustainability science because it addresses the need for knowledge that can guide societal transformations toward more just and sustainable futures (Horcea-Milcu et al. 2024; Kates et al. 2001). It recognizes that the complex, systemic nature of sustainability challenges requires new ways of co-creating and applying knowledge that can bridge the gap between science and society (Miller et al. 2014; Schneidewind et al. 2016).

However, the implementation of TRIs remains very challenging. The field is still evolving, and there is ongoing debate about good practices, methodologies, evaluation criteria, and ethical standards (e.g., Caniglia et al. 2023; Gugerell et al. 2023; Hoffmann et al. 2022; Hölscher et al. 2021; Kump et al. 2023; Martiskainen and Sovacool 2021; Scholz et al. 2024; Stepanova et al. 2020; Wittmayer et al. 2024). In particular, researchers face significant barriers when organizing TRIs, including power asymmetries (Fritz and Meinherz 2020; Horcea-Milcu et al. 2019), institutional constraints (Kump et al. 2023), and competing knowledge systems (Norström et al. 2020). Another key challenge is how to manage the complex and context-sensitive role of emotions in TRIs (Martiskainen and Sovacool 2021).⁴

⁴ Emotions are known to influence collective learning and unlearning in sustainability (van Oers 2024), motivate or demotivate action (Ogunbode et al. 2023; Ojala 2023b), create and maintain group identity and purpose (Van Kleef and Fischer 2016), influence perceptions

While the literature has advanced in identifying these and other challenges, comprehensive frameworks for navigating them in practice remain limited (Caniglia et al. 2023). As Scoones et al. (2020) note, transformative research requires flexible approaches to organizing that can bridge diverse perspectives while maintaining scientific rigor. What is particularly needed is an integrative framework that provides general practical guidance while accommodating the context-specific nature of transformative work (cf. Loorbach et al. 2020; Pereira et al. 2020).

Just sustainability transitions

The concept of *just sustainability transitions* (JUSTRAs; Avelino et al. 2024) builds upon and combines different distinct streams of research, including sustainability transitions (e.g., Grin et al. 2010; Köhler et al. 2019; Loorbach et al. 2017; Schlaile and Urmetzer 2019), environmental justice (e.g., Agyeman et al. 2016), or just transitions (e.g., Wang and Lo 2021). Some scholars argue that questions of justice are already included in the notion of sustainability, considering its intra- and inter-generational nature and multi-scale dimensions encompassing ecological and socio-economic aspects (e.g., following Renn et al. 2009, who argue for understanding sustainability as encompassing the three dimensions of systems integrity, justice, and quality of life). However, the (normative) complexities of sustainable development led to diverging discourses and fields, some of which overlook inequalities, intersectionality, or the politics of cost–benefit distribution, even if justice is, to some extent, already part of the Brundtland definition (WCED 1987). Consequently, critics have emphasized the absence of attention to these issues (e.g., Agyeman et al. 2016; Hopwood et al. 2005; Kasemir 2003).

Against this backdrop, scholars increasingly engage with JUSTRAs in practical terms, working, among other things, on the tensions between different forms of justice within

Footnote 4 (continued)

and ways of dealing with fairness (Hegtvædt and Parris 2014), and create and resolve conflict (e.g., Lindner 2006). Therefore, emotions can lead to disengagement, conflict, conflict resolution, or conflict avoidance, while also creating opportunities by fostering group connection, motivating action, and strengthening shared purpose. The difficulty lies in the complex dynamics between emotions and modes of collaboration that defy simple cause-and-effect relationships. In addition, insufficient understanding of emotions and a lack of emotional competencies can pose challenges for recognizing and engaging with emotions in TRIs (see Grund and Holst 2023 on emotional competencies; Ojala 2023a on critical emotional awareness). Hence, we acknowledge that the work on emotions is relevant for organizing TRIs but, due to our article's scope and the complexity of the relationship between emotions and change, we cannot adequately address this domain in the remainder of this article and must, therefore leave it as an avenue for future research.

transition processes by examining justice issues in specific empirical contexts such as agriculture and food (e.g., Tribaldos and Kortetmäki 2022; Tschersich and Kok 2022), bio-economy (e.g., Bastos Lima 2022; Ramcilovic-Suominen 2023; Schlaile et al. 2024), energy (e.g., Sovacool et al. 2016; Sovacool and Dworkin 2015), mobility (e.g., Humberto 2023; Sheller 2018), or urban systems (e.g., Frantz-eskaki et al. 2021).

Elinor Ostrom's core design principles

The CDPs emerged from the work of Elinor Ostrom (2010, 2015), who investigated whether self-organizing groups could use common-pool resources sustainably. Based on her original fieldwork, she identified eight design principles that synthesize the core factors that affect the likelihood of long-term survival of self-organizing and resource-using groups (Ostrom 2010). Over the years, these design principles have been slightly adapted and reformulated based on evolutionary theory to become the CDPs, a general framework for organizing collective action that can be helpful to all groups

across contexts (Wilson et al. 2013, 2020) and scales (Wilson et al. 2023). In particular, the CDPs systematically distill a basic, core set of considerations that are likely to affect cooperation within and between groups over the long term. As such, the CDPs provide a set of robust reference points that can be helpful in navigating potential organizational tensions, but they should not be seen as a panacea. Following the CDPs is neither inherently necessary nor by itself sufficient for organizing successful collective action. Wilson et al. (2013), for example, explicitly highlight the possibility that additional context-sensitive *auxiliary design principles* (ADPs) may be useful or even necessary for organizing productive collective action.

The initial version of the CDPs as developed by Wilson et al. (2013) is summarized in Fig. 1. CDP 1 calls for clear group boundaries and purposes. CDPs 2–6 aim to create conditions that encourage cooperative behavior and discourage unhelpful ones. CDPs 7–8 make the framework inherently multi-level by highlighting that the same principles can apply to interactions between groups (Wilson et al. 2023). Thus, the CDPs are by design scale-invariant, meaning that

Fig. 1 Ostrom's Core Design Principles based on Wilson et al. (2013). The different colors represent the different focal points of the CDPs. CDP 1 focuses on scope and direction, CDPs 2–6 focus on mechanisms to secure within-group cooperation, and CDPs 7–8 focus on between-group cooperation

	1. Clearly defined boundaries The identity of the group and the parameters of the shared endeavour should be clearly delineated within each context.
	2. Proportional equivalence between benefits and costs In general, the more proportionality is established within groups, the stronger between-group selection will be, relative to within-group selection.
	3. Collective-choice arrangements Consensus-oriented decision-making provides a safeguard against decisions imposed by some members of the group at the expense of others.
	4. Monitoring Monitoring is an essential part of the arsenal of mechanisms that are required to keep within-group selection under control.
	5. Graduated sanctions Group members are often able to impose significant costs on miscreants at low cost to themselves. Given such power of the group over each member, gentle reminders can be extremely effective coordination mechanisms.
	6. Conflict resolution mechanisms Fair conflict resolution mechanisms act as a safeguard against exploitation within groups.
	7. Minimal recognition of rights to organize Self-organizing groups need to be responsible for their own organization, which can pose a challenge in modern large-scale societies.
	8. Appropriate coordination among relevant groups In multi-tier societies, selection occurs at multiple levels, which can be managed by applying the CDPs 1 - 6 not only to groups, but also recursively to the relationships between groups.

they are generally applicable to groups of groups, which is what makes them particularly useful when considering complex nested social phenomena such as sustainability transitions (e.g., consider the work on the *multi-level perspective*; Geels 2011; see also Schlaile et al. 2022, 2023).

In practice, the CDPs function in both descriptive and prescriptive capacities, suggesting two modes of operationalization. In descriptive mode, they serve as diagnostic tools to assess the “cooperative climate” within and between groups, providing insights into existing governance structures and identifying potential issues in collaborative arrangements (Wilson et al. 2013, 2020). In prescriptive mode, they offer evidence-based guidance for planning, designing, and improving governance systems across diverse contexts (e.g., Baggio et al. 2016; Haryanto et al. 2022; Hayes et al. 2021; Robert et al. 2021).

The empirical foundation supporting the CDPs’ effectiveness as a diagnostic tool is substantial and growing, with Cox et al. (2010) confirming their validity across 91 case studies of common-pool resource management, and Baggio et al. (2016) demonstrating their configural nature in explaining success and failure in commons governance. Applications in prescriptive mode have extended beyond natural resource management to areas such as healthcare improvement (Robert et al. 2021), organizational development (Hayes et al. 2021), education (Eirdosh and Hanisch 2020), and systemic knowledge integration in transformative research (Gugerell et al. 2023), while critical scholarship has productively engaged with their perceived limitations regarding power dynamics (Mudliar and Koontz 2021) and cultural contexts (Singleton 2017).

Recent developments have further enhanced the CDPs’ applicability in prescriptive mode by integrating them with insights, methods, and tools from complementary fields such as contextual behavioral science (Hayes et al. 2021), cultural theory (Singleton 2017), sustainability transitions (Schlaile et al. 2022, 2023), and sociology (Gugerell et al. 2023; Mudliar and Koontz 2021). These interdisciplinary approaches have enriched the CDPs’ operationalization across diverse contexts, creating more nuanced frameworks for addressing complex governance challenges. Particularly noteworthy is their compatibility with the perspective of cultural evolution (cf. Eirdosh and Hanisch 2020; Schlaile et al. 2022, 2023), where the CDPs provide a structure for enabling complex, polycentric arrangements for collective action that prevent relevant parties from acting at cross-purposes and instead bring them together to function adaptively as a system (Wilson et al. 2023).

From this evolutionary perspective, JUSTRAs require the deliberate organization of multi-level processes of “system-level cultural evolution in which all three ingredients—the target of selection, variation oriented around the target, and replication of best outcomes—are carefully

managed [with the whole system in mind]” (Wilson et al. 2023, p. 4). The CDPs can, thus, not only serve as a diagnostic framework, but also inform the design of governance systems that can evolve adaptively at multiple scales simultaneously.

Core design principles for just sustainability transitions

Our personal experience as sustainability researchers and teachers has made us keenly aware of the practical challenges that are associated with organizing TRIs for JUSTRAs. As existing research has begun to unpack and elaborate on the complex and contested nature of this work, we have become more aware of the nuances and challenges involved, but we also often still feel overwhelmed by the scope of the task: *How can we organize productive TRIs that engage with the multiple and diverse perspectives on JUSTRAs that we are bound to encounter in specific contexts to learn more about how to make progress toward more just and sustainable futures?*

After careful reflection and in line with existing work on transformative research (e.g., Caniglia et al. 2023; Fazey et al. 2018; Horcea-Milcu et al. 2024; Meadows 2002), our recommended response is to put one’s head down, to stay humble, and to carefully identify and engage with the parties relevant to a particular initiative. Rather than putting our resources into developing grand theories of JUSTRAs, we should acknowledge that justice, sustainability, and therefore also JUSTRAs are deeply socially embedded and essentially contested concepts (Gallie 1956). Engagement with such concepts is, never minding our personal conceptions, destined to be centered on contextual negotiations as matters of concern and the involved or affected parties change. Thus, we should accept that we will never find a consensus understanding of justice and sustainability in practice, or realize an uncontested JUSTRA. Some colleagues even argue that we should expect a state of discord to be the norm (Patterson et al. 2024).

Against this backdrop, the best we can do is to work toward organizing productive TRIs that consider justice and sustainability concerns to a degree that is (and reasonably can be) deemed appropriate by all relevant parties. This includes all involved parties but also those who are not directly involved but still affected by our activities (e.g., Ulrich 1994; Ulrich and Reynolds 2010).⁵

⁵ We want to emphasize here that not all relevant parties (e.g., children, future humans, other animals, ecosystems) may be able to express, represent, and defend their own needs and concerns in ways that are easily understood by us. This requires us to use our reasoning abilities to make sure that their needs and concerns are adequately addressed (see Gonzalez-Ricoy and Rey 2019; Thomsen et al. 2023).

A key metaphor that we found useful for framing this perspective is the notion of “dancing with systems” as advanced by Donella Meadows (2002, p. 2):

The future can't be predicted, but it can be envisioned and brought lovingly into being. Systems can't be controlled, but they can be designed and redesigned. We can't surge forward with certainty into a world of no surprises, but we can expect surprises and learn from them and even profit from them. We can't impose our will upon a system. We can listen to what the system tells us, and discover how its properties and our values can work together to bring forth something much better than could ever be produced by our will alone. We can't control systems or figure them out. But we can dance with them.

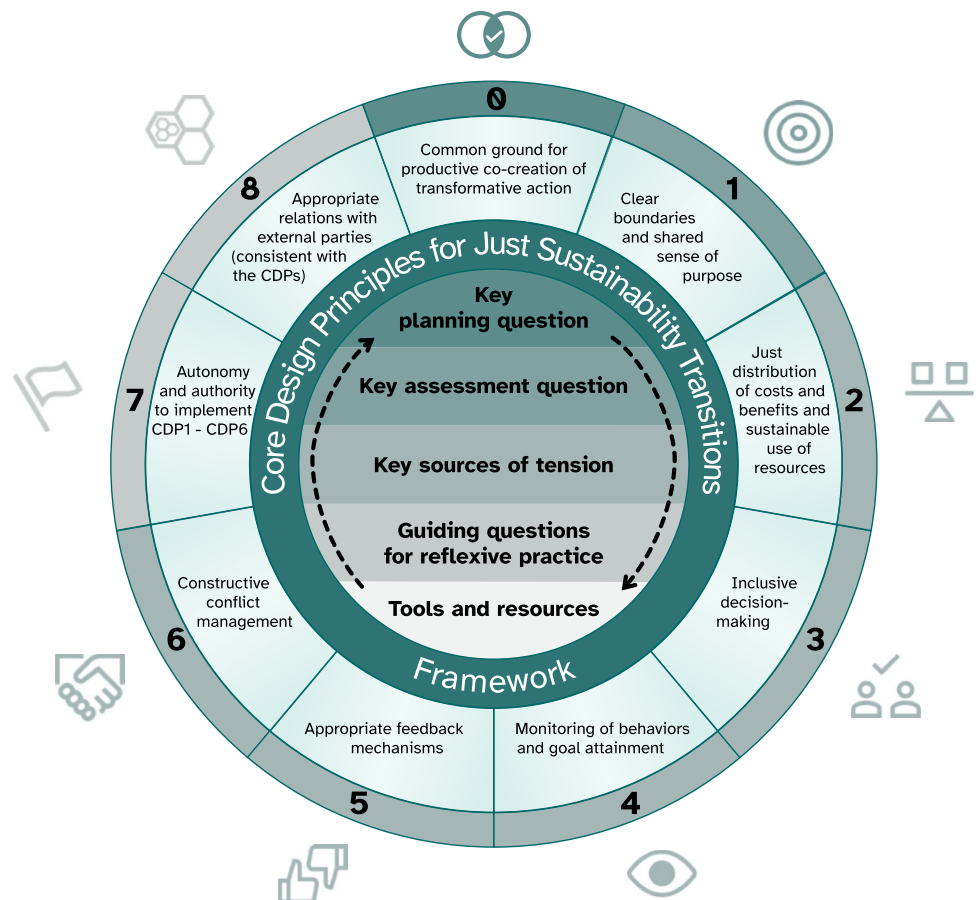
Building on this understanding, we propose the *CDPs for JUSTRAs framework* (see Fig. 2 for an overview and Table 1 in the Appendix for the full version). This framework can be used to help individuals and groups nested within TRIs to collectively align their dance moves with each other in a way that makes productive transformative action more likely. As the name suggests, our framework extends and adapts the CDPs to the context of TRIs working toward JUSTRAs. In

particular, since dancing with systems involves staying humble, listening to, and feeling the system (Meadows 2002), our framework focuses on highlighting key questions, potential sources of tension, and examples of tools and resources relevant to JUSTRAs rather than providing ready-made answers.

The goal of the framework is to provide a set of robust reference points that can help transformative researchers and their partners better navigate the complex terrain of organizing TRIs. For this, we were inspired by and build on the assessment and planning questions for the CDPs by Atkins (2018), the justice-sustainability tensions identified by Ciplet and Harrison (2020), and the guiding questions for justice work in nature-based solutions by Wijsman and Berbés-Blázquez (2022), among others. The result is a modular framework that can serve as a boundary object helpful for orienting an open-ended, critical, but constructive discourse among participants in TRIs (cf. Franco-Torres et al. 2020). Such use of the framework could be facilitated by transformative researchers or other participants such as activists or local changemakers, who become part of a TRI.

Note that we have added a CDP 0 to the eight CDPs to emphasize that the starting point and end of the framework is to help create common ground among all involved parties so that transformative action can be productively co-created. To

Fig. 2 Overview of the CDPs for JUSTRAs framework. The circle in the center outlines the structure of the content available for each CDP and the arrows illustrate that this content can be used for iterative planning and reflection. The different colors associated with the CDPs in the outer ring represent their different focal points. CDP 0 is the foundation upon which all other CDPs build and which they seek to maintain. CDP 1 focuses on the scope and direction of TRIs, CDPs 2–6 focus on mechanisms to secure within-group collaboration, and CDPs 7–8 focus on between-group collaboration. For more details regarding the content of the framework, refer to the full version of the framework in Table 1



stay with the “dancing with systems” metaphor: if we want to dance well together and have a good time, we need to find or prepare a dance floor with enough room to move, and also agree on the music we want to listen to. We have also reworded some of the CDPs to adapt them to the JUSTRA context. For example, we renamed CDP 6 from “conflict resolution mechanisms” to “constructive conflict management” to emphasize that we see conflicts not simply as social issues to be resolved as quickly as possible, but as an inevitable and often valuable part of TRIs that can be managed strategically (see Cuppen 2018).

We offer this framework as a solid starting point for organizing productive TRIs. The strength of the framework is that it helps to get an overview of key challenges associated with organizing TRIs and to anticipate and constructively manage tensions and conflicts. Importantly, these tensions and conflicts are not inherently negative, they are also key to driving self-reflection, as well as constructive debate, innovation, and change (e.g., Cuppen 2018). Our framework encourages reflexive practice to manage these dynamics productively. It also provides examples of potentially helpful tools and resources.

The modular nature of the framework allows for its adaptation to various contexts and scales. Transformative researchers and their partners should only use it as a starting point, adding or modifying elements as needed for their specific needs and initiatives. In particular, the questions, sources of tension, and tools and resources associated with each CDP are not exhaustive but serve as prompts for deeper reflection and discussion among involved participants. Thus, in practice, the application of this framework involves an iterative process of planning, implementation, reflection, and adjustment, encouraging continuous learning and adaptation. This approach recognizes that we cannot control complex systems, but we can learn to dance with them (Meadows 2002).

Illustration of the framework

To illustrate how the CDPs for JUSTRA framework can be applied in practice, we draw inspiration from our own experiences and consider a hypothetical, ideal–typical TRI called the *Dutch Protein Transition Initiative* (DPTI), which focuses on the transformation of the agri-food system in the Netherlands. This 5-year transdisciplinary action research project aims to make the agri-food system and related consumption patterns more sustainable and just by contributing to a shift toward diets with more plant-based proteins and fewer animal-based proteins. The DPTI involves collaboration with various societal actors, including farmers, food producers, supermarket chain representatives, consumers, civil society organizations, and policymakers. The initiative’s goals include co-producing actionable knowledge,

fostering social learning, and designing and testing interventions to promote a just and sustainability-oriented protein transition. It is important to reiterate that the framework, including the key sources of tensions, guiding questions, and examples of tools and resources presented, is intended as a starting point for reflexive engagement by researchers and participants, not as a prescriptive blueprint.

CDP 0: Common ground for productive co-creation of transformative action

The framework posits that establishing common ground for the co-creation of transformative action is a fundamental prerequisite for productive TRIs. For the DPTI, the initial members should recognize that, without a shared understanding of the complex situational context, a baseline of trust, and awareness of power relations, the diverse actors involved in the DPTI (e.g., livestock farmers, plant-based startups, and ethically motivated consumers) may struggle to engage productively with each other and the topic. In particular, the decision of who will facilitate the creation of common ground and the debates around the other CDPs should be made deliberately since it will impact power dynamics (see also CDP 3). From the beginning, a key question should be: ‘How do we create “the right amount” of common ground to support a productive co-creation of transformative action?’. The results of the ensuing activities could be assessed by investigating the extent to which those involved agree that there is sufficient common ground for productive co-creation of transformative action in this initiative.

In practical terms, this involves not aiming for universal consensus, which is often unrealistic (Patterson et al. 2024), but rather fostering a sufficiently shared understanding of different perspectives, terminologies (e.g., what constitutes a “just” protein transition for each group), and the overall situation of concern (e.g., using tools like the *Social-Ecological System* (SES) Framework; McGinnis and Ostrom 2014) to enable productive engagement and navigate inevitable disagreements.

Several tensions could arise in this process. For example, *mismatches in literacies* (Norström et al. 2020) could create communication barriers between academics, agricultural practitioners, or policymakers. Seemingly *irreconcilable differences* in core values (Patterson et al. 2024), for example, between those who see animal husbandry as a legitimate livelihood and those who view it as fundamentally unethical, would need careful handling. There is also the practical question of the *extent* of common ground needed (Patterson et al. 2024); for example, extensive deliberation and negotiation could stall action, yet insufficient groundwork could lead to superficial agreements that fail under pressure. Finally, TRI processes are *vulnerable to capture* by powerful

actors, such as large food corporations or well-funded lobby groups (de Geus 2025), potentially marginalizing less powerful voices like small-scale farmers, underrepresented consumer groups, or other animals beyond humans.

To navigate these complexities, DPTI members could draw on existing inter-disciplinary and transdisciplinary toolkits⁶ (e.g., Bammer 2015; Bammer et al. 2024) such as the *td-net toolbox* (Pohl and Wuelser 2019) to find relevant methods, techniques, and tools. For example, if they are considering the question: ‘Who do we need to work with to move toward JUSTRAs?’, they might find a tool like *Net-Map* (Bosch et al. 2024) and engage in participatory influence network mapping to better understand the stakeholder dynamics surrounding the initiative. Building on the rich history of *participatory action research* (PAR; Cornish et al. 2023) and *co-design* approaches (Busse et al. 2023), they could then use co-design workshops with farmers, consumers and industry representatives to jointly develop a project-specific glossary of key terms, addressing the question: ‘What language do we use to communicate?’. In addition, participatory modeling approaches (e.g., Voinov et al. 2018) could be used to co-create a tentative conceptual framework for the DPTI. Recognizing the critical role of emotions in *transformative learning* (Grund et al. 2024) and JUSTRAs in general (Bogner et al. 2024), such efforts can be supported by trust-building techniques such as *Calling the Circle* (Baldwin 2009) and *Art of Hosting* (Quick and Sandfort 2014) to cultivate safer spaces for the expression of diverse viewpoints. Moreover, tools and practices for supporting (self-)reflexivity such as the *human-scale development approach* (Spiering and Barrera 2021) might be used to articulate and bridge between different needs and sustainability visions within TRIs. To address capture, transparent agenda-setting and facilitation techniques that actively solicit and amplify marginalized voices (see CDP 3), as well as ongoing reflection on the state of common ground in the initiative (see CDP 4), would be essential.

CDP 1: Clear boundaries and shared sense of purpose

The framework suggests that TRIs should strive for sufficiently clear boundaries and a shared sense of purpose among TRI participants. In general, this can be done by focusing on the question: ‘What situations of concern are we trying to change, why, with/for whom, and how?’. The goal is to co-develop a shared understanding of the scope and direction of the initiative. For the DPTI, this could result

in a regional focus on reducing livestock farming in Noord-Brabant.⁷ A potential DPTI mission statement could be: ‘Co-creating pathways for a protein transition in Noord-Brabant that is healthy, ecologically sound, economically viable for producers, and more animal-friendly by 2040’. This mission could serve as a workable boundary object for collective action. To account for changing circumstances and diverging understandings, regular investigations could be carried out to assess the extent to which DPTI members (and other relevant parties) agree that the purpose and boundaries of the initiative are clearly defined and appropriate.

Defining clear boundaries around the DPTI and establishing a shared sense of purpose would likely encounter significant tensions. For example, there is an ever-present risk of *marginalization* (Fritz and Meinherz 2020) when considering questions such as ‘Who has a “stake” and is considered as part of planning activities?’. In particular, the perspectives of powerful industry players or vocal advocacy groups could overshadow the concerns of less organized stakeholders (e.g., migrant farmworkers or animals beyond humans, who are not actively seeking to influence the initiative). In addition, agenda-setting processes are also likely to be influenced by highly contingent situational factors such as *different levels of personal engagement* of participants based on their resources, capacities, and motivations (Dennell 2012). Furthermore, from a socio-technical transitions perspective, *interdependencies* between multiple levels and systems of analysis (Geels 2011) pose a significant analytical challenge; for example, a regional focus on reducing livestock farming is connected to national nitrogen policies in the Netherlands, EU agricultural subsidies, and international feed markets. Finally, the *time horizon* for change would also likely be contested (Ciplet and Harrison 2020): scholars might demand rapid shifts, while incumbent industries and farmers with long-term investments might advocate for slower, incremental changes.

Several practices and tools can be drawn upon to navigate these complexities associated with boundary and purpose delineation. For example, *Critical Systems Heuristics* (Ulrich and Reynolds 2010) can help to make boundary judgments explicit and contestable, and encourage regular reflection on ‘Whose values, voices, and interests may be marginalized?’. *Participatory scenario planning* (e.g., Galang et al. 2025) could be used to explore different *transition pathways* (Collini and Hausemer 2023), helping stakeholders to visualize futures and negotiate a shared direction. Narrative and storytelling techniques (e.g., Guijt et al. 2022) can help stakeholders connect personal values to broader

⁶ These toolkits tend to have a fairly broad focus, listing methods and tools that may be relevant to the implementation and assessment of all CDPs. To avoid repetition, we have included only a few examples of such toolkits as part of CDP 0.

⁷ We chose North Brabant as a hypothetical example here because it “is the most livestock-dense province in the Netherlands and the most livestock-dense region in Europe” (Talsma 2022).

goals, fostering collective identity and action. Finally, the DPTI should recognize that negotiated boundaries and purposes are never static and, therefore, need to establish reflexive and adaptive monitoring mechanisms (see CDP 4) to revise them as new insights emerge.

CDP 2: Just distribution of costs and benefits and sustainable use of resources

The framework emphasizes that TRIs should strive for a just distribution of costs and benefits and a sustainable use of resources in both (i) *internal organization* and (ii) *socio-ecological impact*. For the DPTI, this could mean considering questions such as (i) ‘How do we secure a just distribution of costs and benefits and a sustainable use of resources in relation to our organizational activities as a TRI?’ and (ii) ‘How can we have a socio-ecological impact that is consistent with the ambitions of JUSTRA?’ (as a constraint for CDP 1). In terms of (i) the initiative’s own operational resources and members’ costs and benefits from participating, the assessment question, ‘To what extent do DPTI members agree that the costs and benefits of this initiative are distributed fairly and resources are used sustainably?’ could guide ongoing reflection. In terms of (ii) the envisioned socio-ecological impact, CDP 2 calls for consideration of aspects such as: ‘Who is affected by the current state of affairs and in what ways?’, ‘Who might bear additional burdens from proposed changes in the regional agri-food system?’, ‘Who might reap the benefits?’, and ‘Who makes decisions that affect the distribution of costs, benefits, and resources?’ (see CDP 3). Periodic reviews could be conducted to assess the extent to which participating members, but also other stakeholders which are likely to be affected by the initiative, agree that the costs and benefits of DPTI’s socio-ecological impacts are fairly distributed and that resources are now (or expected to be) used more sustainably.⁸

Significant tensions are likely to arise in both contexts (i and ii). Considering (i) the organization of the initiative, *resource constraints* on participating members might require difficult choices about the intensity and duration of participation. In particular, *unequal starting points* (Avelino 2017) could become a major issue: established meat and dairy industries have considerable resources and political influence compared to emerging plant-based enterprises, potentially skewing how costs, benefits, and risks are perceived and allocated. In terms of (ii) the socio-ecological impact of the initiative, a primary source of tension could

be its *directionality*: efforts focused on ecological sustainability could conflict with a just distribution of resources if they disproportionately harm small-scale farmers (Ciplet and Harrison 2020), or if transition benefits accrue mainly to large corporations. In addition, an *anthropocentric bias* might lead to overlooking the “more-than-human” aspects, such as the welfare of farm animals or the intrinsic value of ecosystems, in cost–benefit calculations (Avelino et al. 2024).

To navigate the tensions associated with (i) the organization of the initiative, its members could decide to use *participatory budgeting* processes (Shah 2007) for the allocation of project funds to enable a more equitable management of the initiative’s own resources. For example, resources might be used to co-design interventions for creating regional transition pathways that create new, equitable opportunities for all participants (see also Busse et al. 2023). Participatory approaches also seem promising for navigating tensions associated with the (ii) the socio-ecological impact of the initiative. For example, *participatory impact assessments* (Morris et al. 2011) or *participatory mapping* (Basupi et al. 2017) of proposed intervention effects that explicitly integrate concepts of *multispecies justice* (e.g., Celermajer et al. 2021) could be useful.

CDP 3: Inclusive decision-making

The framework advocates that TRIs should strive for inclusive decision-making processes since this can contribute to enhancing the legitimacy, ownership, and quality of decisions. For the DPTI, this might mean taking seriously the question: ‘How do we as a group make decisions in a way that includes those who need and want to be involved?’. This calls for moving beyond tokenistic participation to enabling genuine influence for relevant stakeholders (Arnstein 1969), including those who may not be able to express, represent, and defend their own needs and concerns in ways that are easily understood by us (see Gonzalez-Ricoy and Rey 2019; Thomsen et al. 2023). The current level of inclusiveness in decision-making could be assessed by monitoring the extent to which all DPTI members agree that they are meaningfully involved in decisions that affect them.

Several tensions challenge inclusive decision-making. For example, *time pressure* often conflicts with broad consultation (e.g., Ciplet and Harrison 2020). *Resource constraints*, such as limited financial resources or facilitation expertise, can also be a challenge. The *heterogeneous standpoints* within the protein transition debate (see CDPs 0–1) can complicate inclusive decision-making and call its value into question. *Marginalization* is also an ongoing concern in decision-making processes (e.g., Midgley and Rajagopalan 2020). In multi-stakeholder groups, particularly agri-food systems, differences in perceived (change) agency can lead

⁸ We acknowledge that all assessments have blind spots and can only offer an incomplete picture of how a TRI’s socio-ecological impact aligns with JUSTRA ambitions. Therefore, transparency and openness to critique are essential to ensuring the emancipatory function of TRIs (see Ulrich 1994).

to a *diffusion of responsibility* (e.g., Hector et al. 2025). This can result in the avoidance of potentially contentious decisions or the persistence of misconceptions about who can and should be involved in decision-making processes.

To address such issues, it is critical to engage with questions such as: ‘How can we ensure that our JUSTRA ambitions are and remain meaningfully integrated into our decision-making practices and processes?’. One approach could be to acknowledge that full consensus is not always achievable or necessarily desirable (Patterson et al. 2024) and adopt *consent-based decision-making*. This approach focuses on making decisions that are “good enough for now and safe enough to try” (e.g., the *Sociocracy* principles; Rau and Koch-Gonzalez 2023). To confront marginalization, the initiative could draw on *critical systems thinking* methods and techniques (e.g., Midgley and Rajagopalan 2020; Ulrich and Reynolds 2010), or conduct *yellow teaming exercises* to anticipate stakeholders affected by the initiative (Consilience Papers 2024, pp. 93–94). Depending on the initiative’s size, a *polycentric governance* structure (Ostrom 2010) with a steering committee and empowered working groups could help to manage complexity. To manage power dynamics, frameworks such as Avelino’s (2017) *POwer-IN-Transition* can be employed to analyze and consciously work to rebalance power dynamics in meetings and decision-making forums. If win–win arrangements remain elusive, the focus could shift to transparently negotiating trade-offs and seeking procedurally fair outcomes that are “good enough” for now (partial political settlements; Patterson et al. 2024).

CDP 4: Monitoring of behaviors and goal attainment

The framework emphasizes the importance of creating transparency through the monitoring of agreed-upon behaviors and progress toward shared goals. Taking CDP 4 seriously can foster accountability, enable adaptive management, and help to demonstrate a TRI’s socio-ecological impacts. For the DPTI, this could be done by establishing a dedicated *monitoring and evaluation* (M&E) team. The monitoring efforts could be evaluated by investigating the extent to which initiative members and other relevant stakeholders, such as funding agencies, agree that there is appropriate transparency regarding behaviors, decisions, and progress toward shared goals.

In practice, implementing effective monitoring faces several obstacles. First, monitoring behaviors depends on and influences *social dynamics* (e.g., Funder et al. 2013). For example, what constitutes “agreed-upon behavior” in the DPTI would be shaped by conflicting institutional logics (Thornton et al. 2015) and expectations. This can result in behaviors that are not consistently enacted or are enacted in unexpected ways, even when they are formally agreed upon. These deviations may not be openly addressed, as

doing so can be uncomfortable or politically sensitive. At the extremes, monitoring may remain merely symbolic or too oppressive to avoid tension and conflict.

Monitoring goal attainment presents additional challenges. Goals in the DPTI will likely be established amid *uncertainty* in the initial stages of the initiative and may subsequently be deemed unrealistic, misaligned, or conflicting with evolving priorities. Although the need for *flexibility* and learning suggests revisiting and potentially revising goals and mission statements, *standardization* pressures from external stakeholders, such as universities or funding agencies, could prevent adaptation in practice (Kump et al. 2023). Furthermore, the *long-term effects* of the DPTI, whether intended or unintended, will take time to materialize. Premature conclusions or selective reporting could result from the short-term pressures of the five-year project.

Other overarching challenges include *epistemological concerns*, such as the tendency to favor easily quantifiable indicators when selecting what to monitor, and issues of *legitimacy and trust* when one group (e.g., academics) monitors the behavior and goal attainment of another group (e.g., farmers) (Wittmayer et al. 2024). Furthermore, *privacy concerns* may arise when personally identifiable information is collected (Schwartz and Solove 2011). Finally, *technological dependencies* for data collection may create vulnerabilities and exclude those with limited digital literacy (Zscheischler et al. 2022).

To navigate such obstacles, the M&E team could adopt a *Participatory M&E* framework (e.g., Rietbergen-McCracken and Narayan-Parker 1998) to collaboratively establish indicators for the initiative’s economic, social, and environmental goals and co-design processes for collecting legitimate and trustworthy information. *Reflexive Monitoring in Action* (RMA; van Mierlo et al. 2010) is an additional framework that fosters ongoing learning and adaptation at a strategic level. Addressing technological dependencies could entail strengthening data literacy (Wolff et al. 2016) or exploring low-tech approaches. Transparency could be promoted through dashboards or reports that make the results of M&E activities available as shared learning resources.

CDP 5: Appropriate feedback mechanisms

Building on the previous CDP, the framework highlights that TRIs should implement appropriate feedback mechanisms that promote cooperation and social learning. These mechanisms are challenging to design because of the complexity and multi-level nature of JUSTRAs. However, they are essential for realizing productive TRIs that can act as coherent adaptive systems and achieve desired outcomes (see Wilson et al. 2023). For the DPTI, a transdisciplinary integration team with the relevant expertise and mandate to facilitate and support social learning throughout the

initiative could perform this task (see Hoffmann et al. 2022). The effectiveness of the resulting feedback system could be assessed by examining the extent to which DPTI members or independent expert evaluators agree that effective feedback mechanisms are in place.

There are several inherent tensions in establishing adequate feedback mechanisms. For example, the *heterogeneous contexts* of DPTI members may result in differences in how feedback can be effectively provided and received. *Balancing incentives and sanctions* is always delicate (Segerson 2022). Although positive reinforcement is often preferred (Porteous et al. 2015), sanctions addressing uncooperative behavior may be necessary. However, sanctions can backfire (Ostrom 2015). The *timing of feedback* is also critical, especially when aligning short-term individual interests with the long-term collective interests or mission of the DPTI as a whole (Piñeiro et al. 2020).

In practice, the design of multi-level, timely feedback systems could draw on established concepts and frameworks, such as *Adaptive Co-Management* (e.g., Armitage et al. 2010), *Social Learning* (e.g., Blackmore 2010; Keen et al. 2010), and *Developmental Evaluation* (Patton 2011). According to Ostrom's (2015) work on graduated sanctions, any sanctions should be context-appropriate, mild initially, and applied fairly. To ensure constructive feedback, the initiative could decide to sponsor communication training as part of their inclusive decision-making process (see CDP 3), while considering budget constraints and resulting trade-offs (see CDP 2).

CDP 6: Constructive conflict management

The framework emphasizes that TRIs should establish procedures and mechanisms for constructively addressing conflicts and differences that will inevitably arise. Doing so creates an opportunity to transform conflict into an opportunity for greater understanding and innovation (see Cuppen 2018). For the DPTI, this could mean prioritizing the cultivation of a culture of constructive conflict. Progress could be assessed by asking DPTI members and relevant external partners to rate the extent to which conflicts and differences are addressed constructively and respectfully.

However, constructive conflict management would face several key challenges. For example, there is a fundamental tension between *inviting vs. avoiding* conflict (see Cuppen 2018; Patterson et al. 2024). Some stakeholders may naturally view conflict as necessary for progress, while others prefer to avoid confrontation. Cultivating a culture of constructive conflict that is comfortable for those with an avoiding orientation may be difficult and time-consuming. In addition, establishing processes and mechanisms that can appropriately handle the *diversity of conflicts* expected in JUSTRA contexts would be difficult. For the DPTI, conflicts

could range from techno-economic disagreements about land use for protein crops to deep value-based clashes about animal and/or environmental ethics. Constructively managing such conflicts requires different strategies (Stepanova et al. 2020). Furthermore, the complex *interdependencies* within and across societal sectors, as well as over time, mean that conflicts in one area (e.g., between feed producers and livestock farmers) can have far-reaching ripple effects elsewhere (Consilience Papers 2024; Majer et al. 2021). Finally, *integrating formal and informal processes* in a productive way will be key to successfully cultivating a culture of constructive conflict (Malgorzata Ali 2016).

Developing a culture that acknowledges and allows for discord and discomfort may involve establishing clear procedures for addressing grievances and *transition pain* (see Bogner et al. 2024). This could entail incorporating structured processes for *negotiation* (e.g., Fisher et al. 2011) and *mediation* (e.g., Moore 2014). The DPTI could nurture such a culture by investing in *conflict transformation* and capacity-building approaches to address underlying structural issues (e.g., Lederach 2015); building participants' skills in *nonviolent communication* (e.g., Rosenberg 2015); and helping them develop a *sustainability mindset* (e.g., Rimanoczy 2020) as well as awareness of and sensitivity to different worldviews (e.g., Schlaile et al. 2022).

CDP 7: Autonomy and authority to implement CDP 1–CDP 6

The framework explicitly recognizes the multi-level and polycentric nature of TRIs. It argues that groups of people tend to be able to work and collaborate very productively when they have sufficient autonomy and authority to manage their own affairs (see Laloux 2014; Rau and Koch-Gonzalez 2023). This means they can manage agenda-setting, make decisions, allocate resources, and adapt strategies without undue external interference. For the DPTI, this means that the initiative as a whole must secure sufficient resources to establish operational autonomy. In addition, the governance arrangements should allow for *polycentricity* (Ostrom 2010) and provide each group and team with an appropriate amount of freedom to govern itself. The appropriateness of the governance arrangements could be assessed by measuring the extent to which DPTI members agree that the initiative and its respective groups or teams have sufficient autonomy and authority to govern themselves productively.

The DPTI and its constituent groups and teams would face several tensions when seeking to secure their autonomy, especially given the temporary nature of such projects. *Regime structures*, such as incumbent industries, established policies, and institutional logics (e.g., those of funding bodies), may impede the initiative's efforts (see Kump et al. 2023). *Cross-border jurisdiction* may also restrict the initiative's range of action, as agri-food systems and their value

chains often transcend borders. Furthermore, the initiative will likely encounter *resource constraints*, as funding bodies tend to only provide limited and short-term funding commitments. On the internal side, the DPTI faces a nested, multi-level *principal-agent dilemma* (Huffman and Just 2000) of balancing autonomy demands and the legitimacy and accountability of resource use.

Strategies that could increase the initiative's autonomy in the face of regime structures include building broad coalitions, engaging proactively in policy, and diversifying funding (see Kump et al. 2023; Scherer et al. 2013). Ideas from polycentric governance (Ostrom 2010) and self-organizing principles (Laloux 2014) can inform the initiative's internal governance. To ensure the initiative's legitimacy and accountability, it generally needs transparent processes, formal reporting, and an advisory board.

CDP 8: Appropriate relations with external parties (consistent with the CDPs)

Finally, the framework emphasizes that TRIs should develop and maintain appropriate relationships with external parties that are consistent with the CDPs. For the DPTI, the protein transition is evident as a complex, system-wide transformation that cannot be addressed by individual actors or projects. It requires a TRI that unites diverse stakeholders to co-create transformative action. A transition toward sustainable proteins, in particular, involves farmers, food companies, policymakers, scientists, and consumers. These groups operate at different levels, but they require coordination. In such complex transition contexts, fostering productive relationships among these actors is key to achieving societal impact (see Collini and Hausemer 2023). The success of relationship building can be assessed by examining the extent to which participating partners agree that their relationships with the initiative align with the CDPs.

Implementing nested, multi-level governance arrangements in the DPTI presents various interrelated challenges. First, the TRI itself is *complex*, with ecological, economic, cultural, and political dimensions, making it difficult to define (see CDPs 0–1). In addition, *blurry boundaries* between “internal” and “external” actors may complicate coordination and role clarity (see CDPs 0–1). *Power and resource asymmetries* can further distort interactions, enabling dominant actors to shape agendas while sidelining others (see CDPs 2–3 and 6). *Vested interests* may cause some stakeholders to resist transformative change, especially when existing systems serve their goals (see CDPs 0–6). Additional friction is likely to arise from *incompatible institutional logics*, such as differences in timelines, accountability structures, or legal mandates (see CDP 7). Even when actors share broad goals, they may face conflicting operational constraints that hinder cooperation. Finally, ongoing

tension between *cooperation and competition*—whether for funding, visibility, or influence—can undermine trust and limit genuine collaboration (see CDP 2).

Developing appropriate relationships with other parties may require clear engagement protocols and tailored communication. Effective *boundary work* with designated processes for communication and coordination is critical (Andrews et al. 2024; Langley et al. 2019). Participating in multi-stakeholder networks (e.g., ITD-Alliance 2025; STRN, 2025) supports learning and alliance building. Principled and competent communication strategies (e.g., Cooke et al. 2017; Hoffmann et al. 2019; Stirling 2010) are essential to maintaining effective partnerships that align with JUSTRA values. Vigilance against co-optation and openness to constructive collaboration call for a reflexive approach that continually evaluates how relationships can be leveraged to support a TRI's mission (de Geus 2025).

Adapting and extending the framework

The CDPs for JUSTRAs framework are designed as an adaptable guide. Its utility lies in its initial principles, related resources, and capacity to evolve with a TRI's specific context. We encourage TRI members to consider the key sources of tension and the guiding questions, as well as the tools and resources we have identified as starting points for critical reflection and adaptation. For example, in the DPTI case, general tensions such as “resource constraints” under CDP 2 could manifest as a reliance on short-term funding or limited access to land for experiments. This would require a more nuanced investigation of the tensions, the development of more tailored guiding questions, and the identification of additional tools and resources that could help navigate these tensions.

Furthermore, the framework can be extended to include context-specific ADPs that emerge as salient due to unique challenges (Wilson et al. 2013). In the DPTI case, for example, deeply rooted cultural attachments to dairy farming and traditional meat consumption may become significant. This could imply an ADP such as ‘ADP A: Foster culturally sensitive transition pathways’. Then TRI members could develop planning and assessment questions, such as ‘How to acknowledge cultural heritage while co-creating positive future food identities?’. They could also identify tensions, such as ‘Tradition vs. innovation in food culture’, formulate guiding questions, such as ‘What participatory methods bridge cultural food values?’, and compile useful tools and resources, such as cultural anthropology methods and arts-based approaches.

Similarly, if exceptional advocacy skills are required to navigate the politicized landscape of Dutch agricultural policy, an ADP such as ‘ADP B: Cultivate strategic policy engagement and advocacy capabilities’ might be developed.

This iterative adaptation and extension allows the framework to become a living document that responds to the emerging realities of transformative research, enhancing its practical relevance. This adaptability underscores its role as a vehicle for scaffolding learning and reflexive action rather than as a prescriptive blueprint.

Discussion

This paper introduces a new framework for organizing TRIs, adapting Elinor Ostrom's CDPs to the context of JUSTRAs. The framework makes theoretical contributions to sustainability science and provides practical guidance for researchers and their partners involved in TRIs.

Theoretical contributions

The primary theoretical contribution of this work lies in its innovative application of Ostrom's CDPs to the realm of transformative research for JUSTRAs. We enriched the CDPs by adding planning and assessment questions, potential sources of tension, guiding questions for reflexive practice, and examples of additional tools and resources. The resulting framework provides a robust set of reference points for navigating the challenges associated with organizing TRIs. It also strengthens the connection between collective action theory and sustainability science and offers a new perspective on how to manage the complexities of JUSTRAs in practice.

Our work contributes to the ongoing debate about how to navigate TRIs. These debates have centered on various approaches, such as guidance in the form of principles (e.g., Fazey et al. 2018; Wittmayer et al. 2021), reflexive questions based on philosophical considerations (e.g., Wijsman and Berbés-Blázquez 2022; Wittmayer et al. 2024), practices informed by virtue ethics and practical wisdom (e.g., Caniglia et al. 2023), and reflexive frameworks (e.g., Kaljonen et al. 2024). With our work, we follow in the footsteps of these colleagues by demonstrating a novel way to operationalize Ostrom's well-grounded CDPs to organize practical knowledge and foster critical reflexivity in TRIs. In doing so, we respond to calls for approaches that support cultivating more reflexive, transformative research practices (see Kaljonen et al. 2024; Von Seggern et al. 2023; Wittmayer et al. 2024).

Our framework serves as a common reference point for integrating self-reflexive practices into TRIs. These practices include, but are not limited to, critical systems thinking (e.g., Midgley and Rajagopalan 2020; Ulrich and Reynolds 2010), collective sensemaking (e.g., Guijt et al. 2022), and the human-scale development approach (e.g., Spiering and Barrera 2021). Moreover, it opens the door to approaches

that focus on structuring productive debates and negotiations (e.g., Blok 2014; Fisher et al. 2011), makes connections to various governance approaches (e.g., Sociocracy; Rau and Koch-Gonzalez 2023), provides a point of connection for adaptive and reflexive M&E practices such as RMA (e.g., van Mierlo et al. 2010) or developmental evaluation (e.g., Patton 2011), and links to insights from established learning traditions (e.g., Blackmore 2010). It also suggests itself as a natural connection point for work on the role of conflict (e.g., Cuppen 2018) and discord (e.g., Patterson et al. 2024) in sustainability transitions. Furthermore, the framework draws on and contributes to work concerning the obstacles faced by TRIs, such as force conflicts in the academic system (e.g., Kump et al. 2023) and the politics of capture (e.g., de Geus 2025). Last but not least, the framework can serve as a bridge to evolutionary theory on multi-level selection, providing a useful foundation for an extended (cultural evolutionary) multi-level perspective on JUSTRAs (e.g., Schlaile et al. 2022, 2023).

Practical implications

The framework presented in this paper has several practical implications for transformative researchers, stakeholders, science funders, and policymakers. For those participating in TRIs, it provides a structured starting point for organizing and reflecting on purpose-driven collective action. The guiding questions associated with each CDP offer a workable starting point for orientation, planning, and reflexivity during various stages of the TRI. In addition, the modular nature of the framework lends itself to the integration of a broad variety of existing insights, approaches, frameworks, and toolkits relevant to TRIs, as illustrated above and in the appendix.

For science funders and policymakers, our framework can offer a basis for developing guidelines for context-sensitive M&E in and of TRIs. This aspect of the framework addresses a critical need in the field for more nuanced and appropriate evaluation methods for transformative research (e.g., Hölscher et al. 2021; Kump et al. 2023). At the same time, both the framework and the context of JUSTRAs raise additional questions about the adequacy of contemporary (planning-based) funding programs in light of the complexity, essentially contested nature, and resulting uncertainty associated with both the envisioned "dance floor" (to take up Meadows' metaphor again) as well as the changing music, dance moves, and dancing partners (on a related note, see Stanley and Lehman 2015). Simply put, even our ideal-typical case example of the DPTI suggests that a fundamental tension can arise from the incompatibility between rigid, planning-based funding logics, which are still prevalent, and the emergent and uncertain nature of many TRIs (see Kump et al. 2023).

Here, the framework could also be helpful in informing innovative initiatives such as the 'New ways of funding' initiatives (Utrecht University 2025), helping them reflect on the design of 'Impossible projects'. Nevertheless, our example also illustrates the potential value of using the framework in the context of a hypothetical 5-year project.

Limitations and future research

Although our framework provides valuable insights and practical guidance, it is important to recognize its limitations. First, the framework does not provide unambiguous guidelines or ready-made answers. Instead, it highlights key sources of tension and provides relevant questions and examples of tools and resources across various transformative research contexts. This approach allows for flexibility and adaptability but may require significant effort from users to tailor the framework to their specific needs.

Second, we have illustrated the applicability and usefulness of the framework through a hypothetical case based on our previous experiences rather than new empirical evidence. This approach makes the framework accessible and available for further development and scrutiny. However, claims to real-world effectiveness currently rely on the significant, albeit pre-existing, body of evidence indicating the usefulness of the CDPs in other contexts (see the section “[Elinor Ostrom’s Core Design Principles](#)”). Nevertheless, the adapted CDPs for JUSTRAs framework presented here should be rigorously evaluated in the context of actual TRIs.

These limitations point to several promising avenues for future research. First, there is an opportunity for empirical studies to apply and evaluate the framework in TRIs or in the context of accompanying or concomitant research. These studies could offer valuable insights into the framework’s practical applications and areas that could be improved.

Second, future work could focus on developing more context-sensitive M&E and learning measures for TRIs based on our framework. This could involve devising specific indicators or metrics for each CDP to systematically assess how productive TRIs are.

Third, the framework’s modular structure allows for the identification and integration of context-specific ADPs, as well as additional tools and resources, in future research.

This could enhance the framework’s adaptability to diverse cultural and institutional contexts, further increasing its relevance and applicability. For example, while we have only tangentially addressed the role of emotions in TRIs, given their centrality to collaboration and cooperation, the framework could be extended with an ADP calling for practices, tools, and resources to foster the emotional competencies of relevant stakeholders. This would draw attention to key questions for JUSTRAs, such as how to better manage the “transition pain” associated with (often necessary and inevitable) phase-out and exnovation processes in transitions (see Bogner et al. 2024).

Conclusion

In conclusion, our CDPs for JUSTRAs framework support the organization of productive TRIs. We adapted Ostrom’s CDPs for the JUSTRAs context by enriching them with key sources of tension, guiding questions, and examples of useful tools and resources. This provides a modular framework for navigating the complexities of TRIs and can serve as a robust reference point for orientation, planning, and reflexivity during various stages of a TRI. It represents a step forward in our understanding of how to organize and evaluate productive TRIs and offers promising potential for increasing the productivity and impact of TRIs, which should be rigorously evaluated in practice. Future research applying and refining this framework in diverse TRI contexts is crucial to realizing its full potential and supporting the urgent task of advancing JUSTRAs. We call upon our fellow researchers and practitioners to join us in this important endeavor. We are convinced that the CDPs can help us address the complexity of organizing TRIs, allowing us to more productively address today’s persistent challenges. Together, we can move step by step toward more just and sustainable futures.

Appendix

See Table 1.

Table 1 Full version of the CDPs for JUSTRAs framework

Core design principles for just sustainability transitions framework		
CDP 0: Common ground for productive co-creation of transformative action		
<i>Key planning question:</i>	<i>Key assessment question:</i>	
● How do we create “the right amount” of common ground to support productive co-creation of transformative action?	● To what extent do relevant parties agree that there is sufficient common ground for productive co-creation of transformative action in this initiative?	
<i>Key sources of tension:</i>		
● <i>Diversity of perspectives:</i> many different perspectives on just sustainability transitions exist and can become relevant in different contexts		
● <i>Mismatches in literacies:</i> different parties bring different levels of literacies to the table		
● <i>Irreconcilable differences:</i> some values are inherently conflicting, which means that it may seem impossible to reconcile them productively		
● <i>Extent of common ground:</i> it is ex-ante unclear how much common ground is necessary to allow for productive transformative action		
● <i>Vulnerability to capture:</i> co-creative processes are, to some extent, vulnerable to capture and co-optation that can subvert and undermine their co-creative intent		
<i>Examples of guiding questions for reflexive practice:</i>		
● Who should organize and facilitate the CDP-related activities in the initiative?		
● How do we conceptualize the basic structure of just sustainability transitions?		
● How much common ground do we need for productive transformative action?		
● Who do we need to work with to move toward just sustainability transitions?		
● What language (e.g., concepts and terms) do we use to communicate?		
● How can we make our work productive, transparent, and accessible?		
● What common understandings and principles can we presuppose?		
● How do we deal with actors that threaten to capture our efforts?		
<i>Examples of tools and resources:</i>		
Fostering trust and shared understanding: methods to cultivate interpersonal trust, shared values, and a common vision among diverse participants		
● Lansing, A. E., Romero, N. J., Siantz, E., Silva, V., Center, K., Casteel, D., and Gilmer, T. (2023). Building trust: Leadership reflections on community empowerment and engagement in a large urban initiative. <i>BMC Public Health</i> , 23(1), 1252. https://doi.org/10.1186/s12889-023-15860-z		
○ <i>Rationale:</i> This article provides a framework based on community experiences for essential elements in building trust, which is crucial for effective collaboration		
● Baldwin, C. (2009). <i>Calling the Circle: The First and Future Culture</i> . Random House Publishing Group		
○ <i>Rationale:</i> This book introduces the ancient concept “Calling the Circle” as a simple but effective practice for building common ground in groups of people		
● Quick, K., and Sandfort, J. (2014). Learning to facilitate deliberation: Practicing the art of hosting. <i>Critical Policy Studies</i> , 8(3), 300–322. https://doi.org/10.1080/19460171.2014.912959		
○ <i>Rationale:</i> This article discusses the Art of Hosting as a framework for more effective facilitation practice, which is key to fostering shared understanding		
Facilitating collaborative knowledge co-creation and conceptual clarity: techniques for collective problem framing, integrating diverse knowledge types, and developing a common lexicon		
● Voinov, A., Jenni, K., Gray, S., Kolagani, N., Glynn, P. D., Bommel, P., Prell, C., Zellner, M., Paolisso, M., Jordan, R., Sterling, E., Schmitt Olabisi, L., Giabbanelli, P. J., Sun, Z., Le Page, C., Elsworth, S., BenDor, T. K., Hubacek, K., Laursen, B. K., ... Smajgl, A. (2018). Tools and methods in participatory modeling: Selecting the right tool for the job. <i>Environmental Modeling and Software</i> , 109, 232–255. https://doi.org/10.1016/j.envsoft.2018.08.028		
○ <i>Rationale:</i> This article offers guidance on selecting appropriate participatory modeling tools that engage stakeholders in building shared understanding of complex systems		
● Revez, A., Dumphy, N., Harris, C., Mullally, G., Lennon, B., and Gaffney, C. (2020). Beyond forecasting: Using a modified Delphi method to build upon participatory action research in developing principles for a just and inclusive energy transition. <i>International Journal of Qualitative Methods</i> , 19, 1–12. https://doi.org/10.1177/1609406920903218		
○ <i>Rationale:</i> This article illustrates how modified Delphi methods can structure expert and stakeholder input to co-develop principles and frameworks, thereby enhancing shared understanding		
● Oates, L., and Verveld, L. (2024). <i>Just transitions: Conceptual tools for policy reflection</i> . PBL Netherlands Environmental Assessment Agency. https://www.pbl.nl/en/publications/just-transitions-conceptual-tools-for-policy-reflection		
○ <i>Rationale:</i> This report provides conceptual tools that can aid in developing a shared language around complex terms like “just transitions,” crucial for mutual understanding		
● McGinnis, M. D., and Ostrom, E. (2014). Social-ecological system framework: Initial changes and continuing challenges. <i>Ecology and Society</i> , 19(2). JSTOR. https://www.jstor.org/stable/26269580		
○ <i>Rationale:</i> This article presents the social-ecological system (SES) framework, which provides a common vocabulary for constructing and testing alternative theories and models of SES behavior		

Table 1 (continued)

Core design principles for just sustainability transitions framework

Enhancing systems thinking and reflexivity: approaches to encourage critical self-reflection, understand systemic interconnections, and navigate differing perspectives constructively

- Ison, R. (2017). *Systems practice: How to act in situations of uncertainty and complexity in a climate-change world*. (2nd ed.). Springer. <https://doi.org/10.1007/978-1-4471-7351-9>
- *Rationale:* This book provides a comprehensive guide to systems thinking in practice, enabling practitioners to better understand and engage with complex, interconnected challenges inherent in JUSTRAS
- Lazurko, A., Moore, M.-L., Haider, L. J., West, S., and McCarthy, D. D. P. (2025). Reflexivity as a transformative capacity for sustainability science: Introducing a critical systems approach. *Global Sustainability*, 8, e1. <https://doi.org/10.1017/sus.2024.49>
- *Rationale:* This article introduces reflexivity as a key capacity for sustainability science, offering a critical systems approach to navigate complex issues and foster transformative change
- Blok, V. (2014). Look who's talking: Responsible innovation, the paradox of dialogue and the voice of the other in communication and negotiation processes. *Journal of Responsible Innovation*, 1(2), 171–190. <https://doi.org/10.1080/23299460.2014.924239>
- *Rationale:* This article explores the complexities of dialog in responsible innovation, offering insights for navigating diverse voices and potential paradoxes in negotiation processes
- Leveraging overarching interdisciplinary and transdisciplinary (ITD) toolkits:** utilizing curated collections of methods and resources to design and implement effective ITD processes
- Network for Transdisciplinary Research. (2019). Td-net toolbox. Retrieved Jul 11, 2025, from <https://naturalsciences.ch/id/FFCv>
- *Rationale:* This toolbox offers a searchable database of methods for co-producing knowledge, addressing challenging situations in ITD research with step-by-step procedures and shared experiences
- Integration & Implementation Sciences (i2S) team, The Australian National University. (2025). *Integration and Implementation Insights (i2Sights) blog and repository*. Retrieved July 11, 2025, from <https://i2sights.org>
- *Rationale:* This blog and repository provides a comprehensive, indexed compilation of resources from diverse fields for tackling complex societal and environmental problems, fostering a global community of practice
- SHAPE-ID partners. (2021). *SHAPE-ID Toolkit*. Retrieved Retrieved July 11, 2025, from <https://www.shapeidtoolkit.eu/>
- *Rationale:* This toolkit identifies best practices and tools for ITD research involving arts, humanities, and social sciences, guiding users through various goals like funding, evaluation, and skill development

Table 1 (continued)

Core design principles for just sustainability transitions framework	
CDP 1: Clear boundaries and shared sense of purpose	
<i>Key planning question:</i>	<i>Key assessment question:</i>
● What situations of concern are we trying to change, why, with/for whom, and how?	● To what extent do relevant parties agree that the purpose and boundaries of this initiative are clearly defined and appropriate?
<i>Key sources of tension:</i>	
● <i>Interdependencies:</i> interdependencies between, for example, different levels of organization, different sectors of society, and different geographic regions ● <i>Time horizon:</i> different capacities and incentives for long-term planning ● <i>Diversity of normative perspectives, interests, and values:</i> different beliefs about what constitutes desirable change ● <i>Personal engagement:</i> different levels of resources, capabilities, and motivation by participants ● <i>Marginalization:</i> perceived unjust domination by hegemonic parties	
<i>Examples of guiding questions for reflexive practice:</i>	
● Which aspects of just sustainability transitions are we, as researchers, most interested in and able to contribute meaningfully to? ● Which institutions and practices do we want to develop and grow, and which do we want to break down and phase out? ● Which systems, perspectives, and horizons should we strategically (de-)emphasize? ● How do we bring all relevant parties to the table and engage them productively? ● Whose values, voices, and interests may be marginalized in and by our group? ● How much conflict are we willing and able to tolerate?	
<i>examples of tools and resources:</i>	
Defining scope and identifying stakeholders: systematically identifying relevant actors and collaboratively defining the thematic, geographic, and temporal boundaries of the initiative	
● Ulrich, W., and Reynolds, M. (2010). Critical systems heuristics. In M. Reynolds and S. Holwell (Eds.), <i>Systems approaches to managing change: A practical guide</i> (pp. 243–292). Springer. https://doi.org/10.1007/978-1-84882-809-4_6 ○ <i>Rationale:</i> This chapter introduces critical systems heuristics (CSH) as a framework for defining systems of interest based on the central tool of boundary critique, aiding in scope definition ● van den Broek, K. L., Negro, S. O., and Hekkert, M. P. (2024). Mapping mental models in sustainability transitions. <i>Environmental Innovation and Societal Transitions</i>, 51, 100,855. https://doi.org/10.1016/j.eist.2024.100855 ○ <i>Rationale:</i> This article describes M-Tools for mapping mental models, which can help clarify diverse understandings and collaboratively define the system boundaries and focus of the initiative ● European Environment Agency. (2024). <i>Governance in complexity: Sustainability governance under highly uncertain and complex conditions</i>. Publications Office of the European Union. https://data.europa.eu/doi/https://doi.org/10.28000/597121 ○ <i>Rationale:</i> This report offers practical guidance for framing systemic and complex challenges and enabling governance in complexity, relevant for defining boundaries	
Establishing shared purpose and goals: co-creating a clear and agreed-upon vision, objectives, and problem framing for the transformative research initiative	
● Galang, E. I. N. E., Bennett, E. M., Hickey, G. M., Baird, J., Harvey, B., and Sherren, K. (2025). Participatory scenario planning: A social learning approach to build systems thinking and trust for sustainable environmental governance. <i>Environmental Science and Policy</i>, 164, 103,997. https://doi.org/10.1016/j.envsci.2025.103997 ○ <i>Rationale:</i> This article demonstrates how participatory scenario planning can be used to explore different futures and build a shared understanding of goals and pathways for change ● Schäfer, M., Nagy, E., and Kny, J. (2024). Fostering reflective impact orientation in transdisciplinary research—A multi-method workshop format. <i>Methods X</i>, 13. https://doi.org/10.1016/j.mex.2024.102795 - E ○ <i>Rationale:</i> This article presents a practical workshop format for fostering a reflective impact orientation in multi-stakeholder initiatives, aiding in goal clarification ● Guijt, I., Gotret, M. V., Hanchar, A., Deprez, S., and Muckenhirn, R. (2022). <i>The learning power of listening: Practical guidance for using SenseMaker</i>. Practical Action Publishing ○ <i>Rationale:</i> This guide highlights tools like SenseMaker for narrative and storytelling exercises that help TRI participants connect personal values to broader goals, fostering a shared sense of purpose	
Utilizing boundary objects for shared understanding: employing tangible artifacts or shared concepts to facilitate communication and collaboration across different perspectives regarding the initiative's scope and purpose	
● Bierwirth, A., Augenstein, K., Baur, S., Bettin, J., Buhl, J., Frieger, J., Holtz, J., Jensen, T., Kaselofsky, J., Liedtke, C., Palzkill-Vorbeck, A., Saurat, M., Schneidewind, U., Schönborn, S., Schweiger, S., Viebahn, P., and Vondung, F. (2017). <i>Knowledge as transformative energy: On linking models and experiments in the energy transition in buildings</i>. Oekon. http://nbn-resolving.de/urn:nbn:de:bsz:wup4-opus-66582 ○ <i>Rationale:</i> This work describes how complex (agent-based) models can be used as an integration mechanism and boundary object in transformative research ● Farnan, N. (2021). <i>Utopoly: Autopian research method</i> [PhD thesis, University of the Arts London]. https://utopoly.org.uk/ ○ <i>Rationale:</i> This research introduces a game-based utopian research method where participants negotiate and evaluate created utopian possibilities, serving as a dynamic boundary object ● Franco-Torres, M., Rogers, B. C., and Ugarelli, R. M. (2020). A framework to explain the role of boundary objects in sustainability transitions. <i>Environmental Innovation and Societal Transitions</i>, 36, 34–48. https://doi.org/10.1016/j.eist.2020.04.010 ○ <i>Rationale:</i> This article provides a conceptual framework suggesting different roles that boundary objects can play in sustainability transitions, aiding shared understanding	

Table 1 (continued)

Core design principles for just sustainability transitions framework

CDP 2: Just distribution of costs and benefits and sustainable use of resources*Key planning question:*

- How do we ensure a just distribution of costs and benefits and a sustainable use of resources for i) the organization of this initiative and ii) its socio-ecological impacts?

Key assessment question:

- To what extent do relevant parties agree for i) the organization of this initiative and ii) its socio-ecological impacts that the costs and benefits are distributed fairly and resources are (now / expected to be) used (more) sustainably?

Key sources of tension:

- *Directionality*: efforts focused on ecological sustainability can conflict with a just distribution of resources (e.g., by focusing resources on incumbents or constraining the development of developing countries)

- *Anthropocentric bias*: humans sometimes discount and marginalize the needs and experiences of the “more-than-human.”

- *Resource constraints*: resources (e.g., time, money, natural resources) are often scarce

- *Unequal starting points*: The “playing field” may be tilted in favor of established incumbents

Examples of guiding questions for reflexive practice:

- How do we create outcomes that can be considered to be just and sustainable by all relevant parties including the more-than-human?
- What are the different starting points of the parties that are relevant to our efforts?
- How much scarce resources do we need and can we secure, and how do we ensure that they are used sustainably and productively?
- How do we distribute the costs and benefits of participation in our efforts in a just and sustainable way?

Examples of tools and resources:

Assessing and ensuring equitable distribution of impacts: systematically analyzing and addressing how TRI processes and outcomes might differentially affect various social groups, particularly the vulnerable

- Martiskainen, M., Jenkins, K. E. H., Bouzarovski, S., Hopkins, D., Mattioli, G., and Lacey-Barnacle, M. (2021). A spatial whole systems justice approach to sustainability transitions. *Environmental Innovation and Societal Transitions*, 41, 110–112. <https://doi.org/10.1016/j.eist.2021.10.030>

- *Rationale*: This article presents a framework for a spatial whole systems justice approach to sustainability transitions, useful for analyzing distributional impacts

- Costanza-Chock, S. (2020). *Design justice: Community-led practices to build the worlds we need*. The MIT Press

- *Rationale*: This book explores the theory and practice of design justice, an approach led by marginalized communities to challenge structural inequalities, ensuring equitable outcomes

- Owen, R., Bessant, J., and Heintz, M. (Eds.). (2013). *Responsible innovation: Managing the responsible emergence of science and innovation in society*. Wiley

- *Rationale*: This book presents frameworks and practices for responsible innovation, exploring key dimensions such as anticipation, reflexivity, inclusion, and responsiveness to guide the governance of new and emerging technologies and better align their development with societal values and needs

Facilitating fair resource allocation and contribution: employing democratic and transparent processes for decisions on resource use and establishing clear agreements on contributions and benefit sharing

- Shah, A. (2007). *Participatory budgeting*. World Bank Publications

- *Rationale*: This publication serves as an authoritative guide to the principles and practice of participatory budgeting, promoting fair resource allocation

- Hernandez, A. M. (2022). The Phases Model of the Transformation to Sustainability (T2S)—Structuring through the Negotiation Perspective. *Sustainability*, 14(9), Article 9. <https://doi.org/10.3390/su14095024>

- *Rationale*: This article offers a negotiation perspective that can be applied to discussions around fair distribution of costs and benefits among TRI participants and affected parties

Promoting sustainable operational practices: integrating principles of environmental and social sustainability into the day-to-day management and resource consumption of the TRI itself

- Oates, L., and Verveld, L. (2024). *Just transitions: Conceptual tools for policy reflection*. PBL Netherlands Environmental Assessment Agency. <https://www.pbl.nl/en/publications/just-transitions-conceptual-tools-for-policy-reflection>

- *Rationale*: This report, while focused on broader transitions, provides conceptual tools that can inform how TRIs consider the sustainable use of their own operational resources in alignment with justice principles

- Ufua, D. E., Papadopoulos, T., and Midgley, G. (2018). Systemic Lean Intervention: Enhancing Lean with Community Operational Research. *European Journal of Operational Research*, 268(3), 1134–1148. <https://doi.org/10.1016/j.ejor.2017.08.004>

- *Rationale*: This article presents an intervention methodology that integrates theory and methods from community operational research with those from Lean aiming to ensure that waste-reduction initiatives benefit both organizations and their local communities

- Bocken, N., Boons, F., and Baldassarre, B. (2019). Sustainable business model experimentation by understanding ecologies of business models. *Journal of Cleaner Production*, 208, 1498–1512. <https://doi.org/10.1016/j.jclepro.2018.10.159>

- *Rationale*: This article presents a framework for a systemic form of sustainable business model experimentation that can be applied to TRIs

Table 1 (continued)

Core design principles for just sustainability transitions framework	
CDP 3: Inclusive decision-making	
<i>Key planning question:</i>	<i>Key assessment question:</i>
● How do we make decisions in a way that involves those who need and want to be involved?	● To what extent do relevant parties agree that all relevant stakeholders are meaningfully involved in decisions that affect them?
<i>Key sources of tension:</i>	
● <i>Time pressure:</i> the time available for decision-making is limited and often short ● <i>Resource constraints:</i> relevant expertise and skills may not be readily available ● <i>Heterogeneous standpoints:</i> diversity of potentially conflicting standpoints ● <i>Marginalization:</i> not every relevant party can (or is allowed to) speak and is heard ● <i>Diffusion of responsibility:</i> individuals tend to feel less the personal responsibility, the more people are involved	
<i>Examples of guiding questions for reflexive practice:</i>	
● How can we ensure that our just sustainability transition ambitions are and remain meaningfully integrated into decision-making practices, even under various resource constraints? ● How can we facilitate productive reconciliation even between very heterogeneous standpoints? ● How can we make sure that all affected parties (inside and outside of our efforts) are adequately involved in decision-making even if they cannot speak for themselves? ● How can we foster a culture of shared, forward-looking responsibility where personal responsibility is embraced rather than avoided?	
<i>Examples of tools and resources:</i>	
Designing participatory governance structures: establishing clear frameworks and roles that define how decision-making is shared and managed inclusively within the TRI	
● Emerson, K., and Nabatchi, T. (2015). <i>Collaborative governance regimes</i>. Georgetown University Press ● <i>Rationale:</i> This book provides a comprehensive understanding of collaborative governance regimes, offering models for structuring multi-stakeholder decision-making in TRIs ● Rau, T. J., and Koch-Gonzalez, J. (2023). <i>Many voices one song: Shared power with Sociocracy</i>. Sociocracy For All ○ <i>Rationale:</i> This work details the principles and practices of sociocracy, a governance system based on consent decision-making, designed to ensure all voices are heard and integrated ● Greenwood, S., Singer, L., and Willis, W. (2021). <i>Collaborative governance: Principles, processes, and practical tools</i>. Routledge. https://doi.org/10.4324/9781003172062 ○ <i>Rationale:</i> This book is a comprehensive practice-based textbook on collaborative governance, useful for designing inclusive decision-making structures	
Employing methods for inclusive participation and deliberation: utilizing specific techniques to ensure diverse stakeholders can meaningfully contribute to discussions and decision-making processes	
● Boyd, M. R. (2014). Community-based research: Understanding the principles, practices, challenges, and rationale. In P. Leavy (Ed.), <i>The Oxford handbook of qualitative research</i> (pp. 498–517). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199811755.013.006 ○ <i>Rationale:</i> This chapter sets out principles and practices for community-based research, a research approach concerned with ensuring inclusive participation ● Cornish, F., Breton, N., Moreno-Tabarez, U., Delgado, J., Rua, M., de-Graft Aikins, A., and Hodgetts, D. (2023). Participatory action research. <i>Nature Reviews Methods Primers</i>, 3(1), 1–14. https://doi.org/10.1038/s43586-023-00214-1 ○ <i>Rationale:</i> This review article on participatory action research (PAR) sets out key considerations for the design of a PAR project, promoting inclusive methods ● Forester, J. (1999). <i>The deliberative practitioner: Encouraging participatory planning processes</i>. The MIT Press ○ <i>Rationale:</i> This book discusses how skillful deliberative practices can facilitate practical and timely participatory planning processes, ensuring inclusive deliberation	
Addressing power imbalances for equitable inclusion: implementing strategies to mitigate power differentials and ensure marginalized voices can effectively participate and influence decisions	
● Newell, P., Price, R., and Daley, F. (2024). Landscapes of (in)justice: Reflecting on voices, spaces and alliances for just transitions. <i>Energy Research and Social Science</i>, 116, 103,701. https://doi.org/10.1016/j.erss.2024.103701 ○ <i>Rationale:</i> This article discusses the importance of creating inclusive spaces and alliances to ensure marginalized voices are heard in justice-oriented transitions, relevant for power balancing in TRIs ● Avelino, F. (2017). Power in Sustainability Transitions: Analyzing power and (dis)empowerment in transformative change towards sustainability. <i>Environmental Policy and Governance</i>, 27(6), 505–520. https://doi.org/10.1002/etp.1777 ○ <i>Rationale:</i> This article presents the POWER-IN-Transition framework (POINT) for analyzing power and (dis)empowerment in transformative social change, crucial for addressing power imbalances	

Table 1 (continued)

Core design principles for just sustainability transitions framework

CDP 4: Monitoring of behaviors and goal attainment

Key planning question:

- How do we create transparency about relevant behaviors and monitor progress toward common goals?

Key assessment question:

- To what extent do relevant parties agree that there is appropriate transparency regarding behaviors, decisions, and progress toward common goals?

Key sources of tension:

- *Social dynamics*: monitoring depends on and impacts social behaviors
- *Privacy concerns*: transparency demands can conflict with privacy concerns
- *Epistemological concerns*: aspects such as bias in what is monitored
- *Legitimacy and trust*: affected parties demand legitimate and trustworthy monitoring
- *Complexity*: monitoring diverse behaviors and goals at multiple scales presents challenges, particularly in aggregating and interpreting data from various sources
- *Uncertainty*: tracking progress over time is inherently difficult given the limited predictability of the future
- *Long-term effects*: some effects take long time horizons to materialize
- *Flexibility vs. standardization*: conflict between demand for context-sensitive and flexibly adjusted but ideally also standardized and stable information
- *Technological dependencies*: reliance on advanced technologies for monitoring may create new vulnerabilities or exclusions

Examples of guiding questions for reflexive practice:

- How can we ensure that all relevant parties have access to the legitimate and trustworthy information they need to make progress toward common goals?
- How can we ensure that monitoring activities do not undermine legitimate privacy interests?
- How can we manage the complexity and uncertainty of monitoring just sustainability transitions across time, scales, and contexts?
- How can we manage the technological dependencies of monitoring systems in a responsible way?

Examples of tools and resources:

Implementing participatory monitoring and evaluation (PM&E): actively involving stakeholders in defining indicators, collecting and analyzing data, and interpreting findings to track progress and ensure accountability

- Riebergen-McCracken, J., and Narayan-Parker, D. (1998). *Participation and Social Assessment: Tools and Techniques*. World Bank Publications

- *Rationale*: This publication provides a range of tools and techniques for participatory assessment and monitoring, ensuring stakeholder involvement in understanding project impacts and progress

- van Mierlo, B., Regeer, B., van Amstel, M., Arksteijn, M., Beekman, V., Bunders, J., de Cock Buning, T., Elzen, B., Hoes, A.-C., and Leeuwis, C. (2010). *Reflexive monitoring in action: A guide for monitoring system innovation projects*. Wageningen UR. <http://edepot.wur.nl/149471>

- *Rationale*: This guide offers instruction on reflexive monitoring, emphasizing learning and adaptation through continuous reflection on project activities and outcomes with stakeholders
- Danielsen, F., Eicken, H., Funder, M., Johnson, N., Lee, O., Theilade, I., Argyriou, D., and Burgess, N. D. (2022). Community monitoring of natural resource systems and the environment. *Annual Review of Environment and Resources*, 47(1), 637–670. <https://doi.org/10.1146/annurev-environ-012220-022325>

- *Rationale*: This article reviews approaches to community-based monitoring, highlighting how local knowledge and participation can generate valuable data for tracking environmental and social change

Risk management and governance: transformative research initiatives are embedded in a complex environment that requires careful risk management and governance

- Seshadri, A. K., Gambhir, A., and Debnath, R. (2025). Navigating systemic risks in low-carbon energy transitions in an era of global polycrisis. *Global Sustainability*, 8, e6. <https://doi.org/10.1017/sus.2025.7>

- *Rationale*: This article discusses the systemic risks confronting low-carbon transitions and makes practical recommendations for addressing them, relevant for monitoring potential TRI risks

- Aven, T., and Renn, O. (2010). *Risk management and governance: Concepts, guidelines and applications*. Springer

- *Rationale*: This book provides a comprehensive, accessible, and concise guide to risk assessment, management, and governance, applicable to TRI monitoring

- Zscheischler, J., Brunsch, R., Rogga, S., and Scholz, R. W. (2022). Perceived risks and vulnerabilities of employing digitalization and digital data in agriculture – Socially robust orientations from a transdisciplinary process. *Journal of Cleaner Production*, 358, 132,034. <https://doi.org/10.1016/j.jclepro.2022.132034>

- *Rationale*: This article presents a transdisciplinary methodology for adaptively governing unintended consequences of digitalization, informing risk monitoring in TRIs

Table 1 (continued)

Core design principles for just sustainability transitions framework

Ensuring transparency through reporting and data sharing: establishing open mechanisms for sharing information about TRI activities, decisions, finances, and progress with all relevant parties

- Alexander, S. M., Jones, K., Bennett, N. J., Budden, A., Cox, M., Crosas, M., Game, E. T., Geary, J., Hardy, R. D., Johnson, J. T., Karcher, S., Motzer, N., Pittman, J., Randell, H., Silva, J. A., da Silva, P. P., Strasser, C., Strawhacker, C., Stuhl, A., and Weber, N. (2020). Qualitative data sharing and synthesis for sustainability science. *Nature Sustainability*, 3(2), Article 2. <https://doi.org/10.1038/s41893-019-0434-8>

○ *Rationale:* This article discusses practical pathways to facilitate and realize the benefits from sharing and reusing qualitative data, promoting transparency in monitoring

- Evans, K., and Guariguata, M. R. (2008). *Participatory monitoring in tropical forest management: A review of tools, concepts and lessons learned*. CIFOR

○ *Rationale:* This report reviews tools for participatory monitoring, many of which emphasize transparent data sharing and collaborative platforms for visualizing progress

- Maffei, S., Leoni, F., and Villari, B. (2020). Data-driven anticipatory governance. Emerging scenarios in data for policy practices. *Policy Design and Practice*, 3(2), 123–134. <https://doi.org/10.1080/25741292.2020.1763896>

○ *Rationale:* This article discusses the challenges and implications of designing data-driven anticipatory governance, relevant for transparent data use in monitoring

Utilizing evaluation for learning and adaptation: employing evaluation approaches that support ongoing learning, reflection, and adjustment of TRI strategies based on monitoring data and experiences

- Patton, M. Q. (2011). *Developmental evaluation: Applying complexity concepts to enhance innovation and use*. Guilford Press

○ *Rationale:* This book introduces developmental evaluation as an approach suited for complex, emergent initiatives, focusing on real-time feedback and adaptive learning rather than summative judgment

- Wadsworth, Y. (2016). *Everyday Evaluation on the Run* (3rd ed.). Routledge. <https://doi.org/10.4324/9781315428857>

○ *Rationale:* This book offers a practical overview of main evaluation approaches, strategies for involving stakeholders, and evaluation models, supporting learning from monitoring

Table 1 (continued)

Core design principles for just sustainability transitions framework

CDP 5: Appropriate feedback mechanisms*Key planning question:*

- How do we establish appropriate feedback mechanisms that encourage cooperation and discourage unhelpful behaviors?

Key assessment question:

- To what extent do relevant parties agree that effective feedback mechanisms are in place to encourage cooperation and address unhelpful behaviors?

Key sources of tension:

- *Heterogeneous contexts:* feedback mechanisms need to be appropriately aligned across multiple levels of organization and across different cultural contexts
- *Balancing incentives and sanctions:* a mix of positive reinforcement for helpful behavior and sanctions for unhelpful behavior needs to be found that will avoid unintended consequences
- *Timing of feedback:* the timing of feedback faces a tension between providing immediate feedback and allowing time for behaviors to demonstrate long-term impacts
- *Delivery of feedback:* the way feedback is given and received tends to have a significant impact on its outcomes
- *Adaptive learning vs. stability:* the need for stable, predictable feedback mechanisms must be balanced with the ability to adapt to context and changing circumstances

Examples of guiding questions for reflexive practice:

- How can we design, establish, maintain, and evolve appropriately balanced and timed feedback mechanisms that robustly align incentives toward just sustainability transitions across multiple levels of organization and across different cultural contexts?
- How can we ensure that feedback is given and received in a constructive way that supports productive interactions, even in difficult situations?

Examples of tools and resources:

Fostering social learning and adaptive management: establishing iterative cycles of planning, action, monitoring, and reflection to enable continuous learning and strategic adaptation within the TRI

- Armitage, D., Berkes, F., and Doubleday, N. (2010). *Adaptive co-management: Collaboration, learning, and multi-level governance*. UBC Press
- *Rationale:* This book explores adaptive co-management, emphasizing collaborative learning and feedback loops as essential for managing complex social-ecological systems, relevant to TRIs
- Blackmore, C. (Ed.). (2010). *Social learning systems and communities of practice*. Springer. <https://doi.org/10.1007/978-1-84996-133-2>
- *Rationale:* This edited volume offers conceptual tools and suggestions for how people can work and learn together for mutually agreed purposes, informing feedback for social learning
- Keen, M., Brown, V. A., and Dyball, R. (Eds.). (2010). *Social learning in environmental management: Towards a sustainable future*. Earthscan
- *Rationale:* This edited volume provides a comprehensive overview of social learning processes in environmental management, offering insights into how TRIs can structure feedback for collective learning and adaptation

Designing incentives and accountability structures: implementing mechanisms to encourage cooperative behaviors, ensure commitments are met, and address deviations from agreed-upon norms

- Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press
- *Rationale:* This seminal work details the importance of graduated sanctions and monitoring in sustaining collective action, providing principles for designing fair and effective feedback mechanisms in TRIs
- Segerson, K. (2022). Group incentives for environmental protection and natural resource management. *Annual Review of Resource Economics*, 14(1), 597–619. <https://doi.org/10.1146/annurev-resource-111920-020235>
- *Rationale:* This article reviews the use of group incentives to encourage cooperation in environmental contexts, offering insights for designing positive feedback mechanisms in TRIs
- Gieseke, T. (2019). *Collaborative environmental governance frameworks: A practical guide*. CRC Press. <https://doi.org/10.1201/9780429505973>
- *Rationale:* This guide discusses the establishment of formal accountability mechanisms, such as clear roles and reporting requirements, which are crucial for ensuring TRI participants fulfill their commitments

Table 1 (continued)

Core design principles for just sustainability transitions framework

CDP 6: Constructive conflict management

Key planning question:

- How do we deal constructively with the conflicts and differences that will inevitably arise?

Key assessment question:

- To what extent do relevant parties agree that conflicts and differences within the initiative are addressed constructively and respectfully?

Key sources of tension:

- *Inviting vs. avoiding orientation toward conflicts*: conflict can be seen as necessary and valuable, or as avoidable and obstructive
- *Diversity of conflicts*: different strategies may be needed to adequately address different types of conflicts, such as technical or value-based conflicts
- *Individual vs. deterrent*: in the event of a conflict over a violation of agreements, the individual case may be considered on its own merits or used as an example to deter others
- *Interdependencies*: conflicts can span multiple levels of organization, sectors of society, and geographic regions and interact with each other
- *Transparency vs. confidentiality*: appropriate levels of openness are needed that balance public accountability with the need for safe spaces for negotiation
- *Formal and informal processes*: formal conflict management mechanisms need to be integrated with always existing informal, culturally-specific approaches

Examples of guiding questions for reflexive practice:

- How can we evolve a conflict culture that acknowledges and constructively deals with the inevitability, necessity, diversity, and contextual and emotional nature of conflict in just sustainability transitions by integrating formal and informal conflict management mechanisms?
- How can we constructively address conflicts that arise from the interdependence of multiple levels of organization, sectors of society, and geographic regions?

Examples of tools and resources:

Analyzing and understanding conflict dynamics: frameworks that help to analyze and understand conflict dynamics from multiple perspectives

- Lindner, E. G. (2006). *Emotion and conflict: Why it is important to understand how emotions affect conflict and how conflict affects emotions*. In M. Deutsch, P. Coleman, and E. C. Marcus (Eds.), *The handbook of conflict resolution: Theory and practice* (2nd ed., pp. 268–293). Jossey-Bass
- *Rationale*: This chapter discusses the crucial role of emotions in conflict, which is essential for understanding conflict dynamics
- Majer, J. M., Barth, M., Zhang, H., Van Treek, M., and Trötschel, R. (2021). Resolving conflicts between people and over time in the transformation toward sustainability: A framework of interdependent conflicts. *Frontiers in Psychology*, 12, 623,757. <https://doi.org/10.3389/fpsyg.2021.623757>
- *Rationale*: This article analyzes challenges in interdependent conflicts during sustainability transformations and highlights intervention approaches for understanding these dynamics
- Stepanova, O., Polk, M., and Saldert, H. (2020). Understanding mechanisms of conflict resolution beyond collaboration: An interdisciplinary typology of knowledge types and their integration in practice. *Sustainability Science*, 15(1), 263–279. <https://doi.org/10.1007/s11625-019-00690-z>

Facilitating constructive negotiation and dialog: utilizing principled negotiation, mediation, and facilitated dialog to help parties collaboratively resolve disagreements and find mutually acceptable solutions

- Fisher, R., Ury, W. L., and Patton, B. (2011). *Getting to yes: Negotiating agreement without giving in* (3rd ed.). Penguin Books
- *Rationale*: This foundational text on principled negotiation focuses on interests rather than positions to achieve win–win outcomes, highly applicable for TRI disputes
- Moore, C. W. (2014). *The mediation process: Practical strategies for resolving conflict*. John Wiley and Sons
- *Rationale*: This book offers a comprehensive guide to the mediation process, providing practical strategies for third-party neutrals to assist disputing parties in reaching voluntary agreements
- Renn, O., and Webler, T. (1992). Anticipating conflicts: Public participation in managing the solid waste crisis. *GAIA—Ecological Perspectives for Science and Society*, 1(2), 84–94. <https://doi.org/10.14512/gaia.1.2.5>

- *Rationale*: This article presents a three-step-model for constructive public participation in TRIs, which can facilitate dialog and negotiation

Adopting conflict transformation and capacity building approaches: moving beyond dispute settlement to address underlying structural issues and build participants' skills for managing conflict effectively

- Lederach, J. (2015). *Little book of conflict transformation: Clear articulation of the guiding principles by a pioneer in the field*. Simon and Schuster
- *Rationale*: This book introduces the concept of conflict transformation, focusing on addressing root causes and changing relationships and structures for long-term positive change, suitable for JUSTRAs contexts
- Rosenberg, M. B. (2015). *Nonviolent communication: A language of life*. PuddleDancer Press
- *Rationale*: This book provides a framework for empathetic communication (NVC) that can build participants' skills in expressing needs and hearing others, crucial for preventing and de-escalating conflict
- Rimanoczy, I. (2020). *The sustainability mindset principles: A guide to develop a mindset for a better world*. Routledge. <https://doi.org/10.4324/9781003095637>
- *Rationale*: This guide introduces the 12 principles for a sustainability mindset as a framework for sustainability-oriented personal development, which can contribute to conflict transformation

Table 1 (continued)

Core design principles for just sustainability transitions framework

CDP 7: Autonomy and authority to implement CDP 1–CDP 6

Key planning question:

- How do we ensure that we have enough autonomy and authority to productively manage our own affairs?

Key assessment question:

- To what extent do relevant parties agree that the initiative/group/team has sufficient autonomy and authority to govern itself productively?

Key sources of tension:

- *Regime structures*: established regime structures may seek to block, capture, or delegitimize just sustainability transitions initiatives
- *Cross-border jurisdiction*: just sustainability transitions are transboundary phenomena that can challenge jurisprudence as they span multiple jurisdictions
- *Resource constraints*: autonomy depends on having access to the necessary resources (e.g., funding, expertise, etc.) to exercise it effectively
- *Principal-agent dilemma*: autonomy needs to be constrained by mechanisms that ensure the legitimacy and accountability of the initiative

Examples of guiding questions for reflexive practice:

- How can we ensure the autonomy and authority of our initiatives in the face of established regime structures, the transboundary nature of just sustainability transitions, and often very limited resources?
- How can we ensure the legitimacy of our initiatives and hold ourselves accountable to all relevant parties?

Examples of tools and resources:

Designing enabling governance structures for self-management: intentionally creating internal organizational frameworks and rules that support the TRI's autonomy and effective decision-making

- Ostrom, E. (2010). Beyond markets and states: Polycentric governance of complex economic systems. *American Economic Review*, 100(3), 641–672

○ *Rationale*: This article discusses polycentric governance, offering principles for designing nested governance structures that allow for autonomy at different levels, relevant for TRI self-management

- Laloux, F. (2014). *Reinventing organizations: A guide to creating organizations inspired by the next stage in human consciousness*. Nelson Parker

○ *Rationale*: This book describes in practical detail how organizations can operate in more soulful and purposeful ways, informing the design of autonomous TRI structures

- Massa, F. G., and O'Mahony, S. (2021). Order from chaos: How networked activists self-organize by creating a participation architecture. *Administrative Science Quarterly*, 66(4), 990–1033. <https://doi.org/10.1177/00018392211008880>

○ *Rationale*: This article discusses how networked activists self-organize through open, digital networks to achieve shared aims, relevant for TRI self-management architectures

Building internal capacity for effective action

- Fazey, I., Schipke, N., Caniglia, G., Patterson, J., Hultman, J., van Mierlo, B., Säwe, F., Wiek, A., Wittmayer, J., Aldunce, P., Al Waer, H., Battacharya, N., Bradbury, H., Carmen, E., Colvin, J., Cvitanovic, C., D'Souza, M., Gopel, M., Goldstein, B., ... Wyborn, C. (2018). Ten essentials for action-oriented and second order energy transitions, transformations and climate change research. *Energy Research and Social Science*, 40, 54–70. <https://doi.org/10.1016/j.erss.2017.11.026>

○ *Rationale*: This article provides an overview of ten essential principles that TRI participants should take to heart to build capacity for effective action

- Jones, M., Hoague, D., Spriggs, R., Catalan, E., Adams, N., Watkins, T., Tripati, A., and Norris, K. C. (2022). Establishing a framework for sustainable community action research. *Ethnicity and Disease*, 32(4), 333–340. <https://doi.org/10.18865/ed.32.4.333>

○ *Rationale*: This article describes a framework that emphasizes building community capacity for research, which supports the autonomy of community partners within TRIs

- Schuppenlehner-Kloyber, E., and Penker, M. (2015). Managing group processes in transdisciplinary future studies: How to facilitate social learning and capacity building for self-organised action towards sustainable urban development? *Futures*, 65, 57–71. <https://doi.org/10.1016/j.futures.2014.08.012>

○ *Rationale*: This article makes recommendations for how to effectively promote social learning and capacity building for self-organized action, enhancing TRI autonomy

Securing resources and negotiating external legitimacy

: developing strategies to mobilize necessary resources and engage with external authorities to gain recognition and operational freedom

- Kump, B., Wittmayer, J., Bognier, K., and Beekman, M. (2023). Navigating force conflicts: A case study on strategies of transformative research in the current academic system. *Journal of Cleaner Production*, 412, 137,374. <https://doi.org/10.1016/j.jclepro.2023.137374>

○ *Rationale*: This article presents ideal-typical strategies for how transformative researchers can navigate force conflicts in the academic system to secure resources and legitimacy

- Scherer, A. G., Palazzo, G., and Seidl, D. (2013). Managing legitimacy in complex and heterogeneous environments: Sustainable development in a globalized world. *Journal of Management Studies*, 50(2), 259–284. <https://doi.org/https://doi.org/10.1111/joms.12014>

○ *Rationale*: This article proposes a theoretical framework for applying different response strategies to legitimacy problems, useful for TRIs negotiating external legitimacy

- Stupak, I., Mansoor, M., and Smith, C. T. (2021). Conceptual framework for increasing legitimacy and trust of sustainability governance. *Energy, Sustainability and Society*, 11(1), 5. <https://doi.org/10.1186/s13705-021-00280-x>

○ *Rationale*: This article develops a conceptual framework for increasing legitimacy and trust in sustainability governance, aiding TRIs in securing external recognition

Table 1 (continued)

Core design principles for just sustainability transitions framework	
CDP 8: Appropriate relations with external parties (consistent with the CDPs)	
<i>Key planning question:</i>	<i>Key assessment question:</i>
● How do we develop and maintain appropriate relations with external parties that are in line with the CDPs?	● To what extent do relevant parties agree that the initiative's relationships with external parties align with the CDPs?
<i>Key sources of tension:</i>	
● <i>Boundary permeability:</i> the classification of who is “internal” vs. “external” to the initiative is likely to be fluid and change over time ● <i>Asymmetries:</i> external parties will vary widely in terms of interests, power, resources, capabilities, or planning horizons, which may create asymmetries that are difficult to bridge and manage effectively ● <i>Legal incompatibility:</i> differences in legal and regulatory frameworks can make it difficult to achieve productive relations with parties from other jurisdictions ● <i>Cooperation vs. competition:</i> both cooperation and competition are necessary and need to be balanced scale up and accelerate just sustainability transitions	
<i>Examples of guiding questions for reflexive practice:</i>	
● How can we develop and maintain appropriate relations with an evolving set of external parties that may in some respects be very different from us? ● How can we leverage both cooperation and competition with external parties to scale up and accelerate just sustainability transitions?	
<i>Examples of tools and resources:</i>	
Strategically managing external interfaces and boundaries: employing individuals or processes to facilitate communication, translate knowledge, and coordinate with actors outside the core TRI	
● Langley, A., Lindberg, K., Mørk, B. E., Nicolini, D., Raviola, E., and Walter, L. (2019). Boundary work among groups, occupations, and organizations: From cartography to process. <i>Academy of Management Annals</i>, 13(2), 704–736. https://doi.org/10.5465/annals.2017.0089 ● Andrews, L. M., Munaretto, S., Mees, H. L. P., and Driessen, P. J. (2024). Conceptualising boundary work activities to enhance credible, salient and legitimate knowledge in sustainability transdisciplinary research projects. <i>Environmental Science and Policy</i>, 155, 103,722. https://doi.org/10.1016/j.envsci.2024.103722 ● <i>Rationale:</i> This article develops a conceptual and analytical framework of 12 boundary work activities that enhance credible, salient, and legitimate knowledge in managing external interfaces ● Termeer, C. J. A. M., Dewulf, A., Breeman, G., and Stiller, S. J. (2015). Governance capabilities for dealing wisely with wicked problems. <i>Administration and Society</i>, 47(6), 680–710. https://doi.org/10.1177/0095399712469195	
Building and participating in multi-stakeholder networks and platforms: needed to address complex problems, relevant for TRIs interacting with diverse external systems impact	
● ITD-Alliance (2025). <i>Global Alliance for Inter- and Transdisciplinarity</i>. Retrieved from https://itd-alliance.org/ ● <i>Rationale:</i> The ITD Alliance aims to link networks and individuals with shared interests in ITD practices for addressing complex problems, serving as a key platform for external relations ● Sustainability Transitions Research Network. (n.d.). <i>Homepage</i>. Retrieved from https://transitionnetwork.org/ ● <i>Rationale:</i> This network represents a platform where TRIs can connect with external researchers and practitioners to share insights and collaborate on sustainability transitions ● European Commission. (2025). <i>Cohesion for Transitions (C4T) Community of Practice</i>. Retrieved July 11, 2025, from https://ec.europa.eu/regional_policy/policy/communities-and-networks/cohesion-4-transition_en ● <i>Rationale:</i> This community of practice is an example of a multi-stakeholder platform where TRIs could engage for knowledge sharing and collaborative action related to just transitions	
Ensuring ethical engagement and strategic communication with external parties: developing clear guidelines for partnerships and plans for effectively communicating the TRI's work and values to outside audiences	
● Cooke, S. J., Gallagher, A. J., Sopinka, N. M., Nguyen, V. M., Skubel, R. A., Hammerschlag, N., Boon, S., Young, N., and Danylichuk, A. J. (2017). Considerations for effective science communication. <i>FACETS</i>, 2(1), 233–248. https://doi.org/10.1139/facets-2016-0055 ● <i>Rationale:</i> This article offers guidance on effective science communication, essential for TRIs engaging with external parties ● Stirling, A. (2010). Keep it complex. <i>Nature</i>, 468(7327). https://doi.org/10.1038/4681029a ● <i>Rationale:</i> This article cautions against simplifying advice and calls for rendering decision-makers accountable, informing ethical communication with external parties ● Hoffmann, S., Thompson Klein, J., and Pohl, C. (2019). Linking transdisciplinary research projects with science and practice at large: Introducing insights from knowledge utilization. <i>Environmental Science and Policy</i>, 102, 36–42. https://doi.org/10.1016/j.envsci.2019.08.011 ● <i>Rationale:</i> This article presents a conceptual model for an interactive transdisciplinary research process that accounts for the social and relational nature of knowledge utilization, guiding ethical engagement	

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