
A practical framework for assessing transdisciplinary collaboration in innovation projects

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Abstract: Innovation projects increasingly depend on transdisciplinary collaboration, however, there is limited consensus on which criteria most consistently support successful collaboration and how to operationalize them for practice. This research-in-progress paper examines how 11 key criteria derived from the literature can support stakeholder alignment in innovation contexts. Building on a prior literature review, the study revisited how these criteria had been measured in existing research, translated relevant measurement approaches into practical tools, structured these tools into an iterative Plan–Align–Check–Refine process, and compared the proposed toolkit with existing collaboration and alignment tools. The results show that the identified criteria can be linked to concrete assessment methods and adapted into practical prompts, charter elements, glossary entries, and alignment questions. These results suggest that stakeholder alignment in transdisciplinary innovation projects can be better supported by linking key collaboration criteria to measurement approaches, practical tools, and an iterative process structure.

Keywords: Transdisciplinary collaboration; Multistakeholder collaboration; Innovation management; Stakeholder alignment; Collaboration toolkit; Multistakeholder innovation; Collaboration assessment

1. Introduction

Contemporary innovation projects generally involve teams that combine different disciplines, perspectives, and stakeholder objectives. While such diversity can generate novel insights, it also introduces coordination challenges that traditional project management tools struggle to address. As a result, project managers often make swift decisions about team composition, onboarding, and co-design without reliable ways to assess alignment or collaboration readiness in multistakeholder teams. This is especially problematic because innovation management metrics continue to prioritize scientific, technological, and financial indicators, even though cultural, social, and organizational factors are increasingly recognized as essential to how teams function in complex collaborations (Dziallas & Blind, 2019; Hoffmann et al., 2022; Neto et al., 2024; Schmidt, 2023; Zhang et al., 2023).

In this context, transdisciplinary collaboration has become especially relevant, as it involves the joint framing of problems and co-production of knowledge by diverse academic and non-academic actors to address complex real-world challenges that extend beyond disciplinary boundaries (Lang et al., 2012). However, despite the growing importance of this field, there is still limited consensus around which criteria most consistently underpin successful transdisciplinary collaboration, and even less clarity on how such criteria can be operationalized into practical tools or frameworks for innovation management. Here, success is not defined only as the achievement of project outcomes, but as the presence of core collaborative conditions that enable the process to function effectively and support intended outcomes through coordination, knowledge integration, and sustained participation (Stokols et al., 2008; Hall et al., 2018; Lang et al., 2012). Existing studies have made several important contributions by identifying principles such as joint problem framing, reflexivity, trust, leadership, and collaborative planning (Ayala-Orozco et al., 2018; Bergmann et al., 2021; Hall et al., 2018; Polk, 2015). However, these contributions often remain theoretical, academically oriented, or closely tied to specific project contexts, making it difficult to understand applicability across settings or translate into practical guidance for project managers. A clearer and more operationalizable set of key criteria in the form of a toolkit is therefore needed to support the design, assessment, and improvement of transdisciplinary collaboration in innovation contexts. The practical need for such a toolkit became more concrete in the context of the ReCure-2 project, a transdisciplinary innovation project focused on reusable medical packaging. In this setting, it became clear that alignment

was needed not only around the substantive problem and intended impact, but also around project values, scope, stakeholder roles, governance, assumptions, risks, and professional language.

This research-in-progress paper builds on a prior literature review that identified 11 key criteria for successful transdisciplinary collaboration and takes the next step of examining how these criteria can support stakeholder alignment in practice. The paper argues that the gap is not simply an absence of awareness about what matters in collaboration, but a lack of clarity around how key criteria can be measured, translated into practical tools, and structured into a coherent process that project managers can use in innovation settings. The guiding research question is therefore: *How can key criteria for transdisciplinary collaboration support stakeholder alignment in practice?* More specifically: *(1) How can key criteria for successful transdisciplinary collaboration be measured? (2) How can these measurement items support the operationalization of the key criteria into practical tools? (3) How can these tools be structured into a coherent process that supports alignment throughout the project lifecycle? and (4) How does the proposed toolkit compare to existing tools and frameworks for collaboration and alignment?*

2. Methods

The present study builds on a literature review of transdisciplinary collaboration research, team science, and organizational studies to identify key criteria for successful transdisciplinary collaboration. A Web of Science search using predefined terms related to cross-disciplinary collaboration and success factors yielded 9,106 records. After filtering by citation count and relevance, screening titles and abstracts, and conducting full-text eligibility checks, 21 papers were retained for qualitative analysis.

These 21 papers were imported into NVivo for thematic analysis. The analysis focused on extracting and comparing terms used to describe collaboration-relevant conditions, factors, principles, dimensions, and criteria. Through iterative comparison and clustering of these terms, a consolidated set of 11 key criteria for successful transdisciplinary collaboration was developed.

The present study focuses on how these literature-derived key criteria can support stakeholder alignment in practice. To address this, the

study proceeded in four steps. First, the identified key criteria were revisited through a second pass through the literature, focusing on how they had been assessed in prior research. Measurement approaches, including pre-existing assessment tools, surveys, scales, and frameworks, were coded and mapped to the corresponding criteria, and additional measurement literature was consulted selectively to address remaining gaps.

Second, these measurement approaches were used to inform the operationalization of the key criteria into practical tools. Relevant items, prompts, and indicators were translated from existing measurement items in the literature into more accessible, transdisciplinary-oriented materials for project managers and stakeholders, including reflection prompts, charter questions, glossary inputs, and assessment items. Third, the resulting tools were structured into an iterative process intended to support alignment throughout the project lifecycle. This led to the development of a toolkit organized around four phases: Plan, Align, Check, and Refine.

Fourth, an exploratory market scan of existing collaboration and alignment tools was conducted to compare the proposed toolkit with other existing tools, frameworks, and platforms. The scan applied logic derived from qualitative assessment metrics for measuring the output of tools. These assessments include constructs of usefulness, ease of use, and task–technology fit and also assess whether each tool supports one or more of the four proposed phases of the toolkit (Plan, Align, Check, Refine). As the scan was exploratory rather than systematic, these criteria were used heuristically for positioning rather than as a validated comparative tool (Davis, 1989; Goodhue & Thompson, 1995).

The toolkit was also informed by its planned application in ReCure-2, a transdisciplinary innovation project facilitated by the REuse Lab at the University of Antwerp, the same research group in which the author is based. This project provided a relevant opportunity to explore how measurement-informed key criteria could be translated into practical tools during the initial phase of collaboration. In this study, reCure-2 served as an early motivating context that helped clarify the kinds of alignment needs the toolkit would need to address in practice, particularly around problem framing, impact, stakeholder roles, governance, assumptions, risks, and shared terminology.

3. Results

First, several measurement approaches were identified for each of the 11 key criteria for successful transdisciplinary collaboration. This showed that the criteria were not only conceptually relevant but could also be linked to concrete forms of assessment identified in prior literature. Some criteria had well-established measurement options, while others were assessed more indirectly through project documentation, behavioral indicators, or reflective processes. For example, shared values could be approached through value-fit surveys, aligned goals through goal-congruence items, shared leadership through leadership and governance indicators, trust and psychological safety through validated scales, and semantic and cultural understanding through intercultural competence tools. This step provided a first basis for understanding how the key criteria could move from abstract concepts toward practical use. A summary is provided in Appendix A.

Second, these measurement approaches were translated into practical tools for transdisciplinary stakeholder alignment. The identified measures from the literature were not copied directly but were used to inform the content, structure, and wording of the toolkit components. In this manner, measurement items became a source of inspiration for practical prompts, reflection questions, and assessment of items suited to transdisciplinary innovation settings. For example, measurement logic related to aligned goals informed questions about project goals and why they matter, whereas value-related measures informed prompts on project values. Additionally, role and governance-related measures informed sections on project collaborators and decision-making, and trust, communication, and semantic understanding informed the glossary, collaboration assumptions, and alignment assessment. This part bridged the gap between the conceptual identification of key criteria and their operationalization into practical tools for project managers and stakeholders. Examples of how these measurement approaches informed specific toolkit components are summarized in Appendix B.

The third component was the structure of these tools into a coherent process that supports alignment throughout the project lifecycle. The toolkit was designed as an iterative system organized around four phases: Plan, Align, Check, and Refine.

In the Plan phase, the aim is to establish a shared foundation for collaboration by making key project elements explicit from the outset.

This phase includes the Problem Statement, Impact Statement, Transdisciplinary Collaboration Charter, and Collaboration Glossary. Together, these tools help stakeholders articulate and align on the problem, intended impact, project goals, values, scope, assumptions, roles, governance, risks, and key terminology. Thus, the toolkit addresses a recurring challenge in transdisciplinary collaboration: teams often begin working together without first surfacing differing interpretations of the problem, the project's purpose, or the conditions needed for successful collaboration.

In the Align phase, the toolkit moves from collective framing to assessment. Here, the Collaboration Alignment Assessment is used to evaluate whether stakeholders are aligned in their experiences of collaboration across the 11 key criteria. The measurement approaches identified in the literature informed both the content and structure of this tool, as well as the wording of several prompts embedded in the broader toolkit. The purpose is not only to capture strengths, but also to make differences in perception visible across stakeholders.

In the Check phase, the assessment from the Align phase is repeated after the first 2-3 months to observe how alignment between the stakeholders and the project evolves over time. This reflects the assumption that stakeholder motivations, role structures, contextual constraints, and communication needs may shift over the course of a project. Alignment is therefore treated as a dynamic condition that should be monitored rather than assumed to remain stable.

In the Refine phase, any misalignments identified during the assessment are addressed by returning to the foundational tools from the Plan phase. Project managers can revisit the problem of framing, impact assumptions, glossary, or charter elements to identify where the misalignment lies within the collaboration. The toolkit, therefore, functions as an iterative cycle rather than a linear sequence, linking early collaboration design with later diagnosis and adjustment. An overview of this four-phase structure is presented in Appendix C, while a more detailed mapping of toolkit components to the key criteria is provided in Appendix D.

Finally, the proposed toolkit was compared to other existing tools, frameworks, and platforms for collaboration and alignment. The exploratory market scan suggested that existing tools often address key aspects of the collaboration process, such as planning, dialogue, reflection, and assessment. However, fewer appeared to provide an integrated,

iterative structure that connects early project alignment, ongoing assessment, repeated monitoring, and realignment into a single coherent process. This comparison helped justify the intended contribution of the proposed toolkit: to connect literature-derived key criteria, measurement-informed operationalization, and iterative alignment into a single, structured approach. See Appendix E.

4. Implications and Future Directions

This research-in-progress paper advances the field of innovation management by shifting from conceptually identified criteria for successful transdisciplinary collaboration to a more practical and operationalizable approach to stakeholder alignment. The proposed toolkit positions stakeholder collaboration as a critical yet measurable and improvable target throughout the project lifecycle, rather than as a secondary, overlooked aspect of transdisciplinary innovation projects. Consequently, this study begins to bridge the gap between existing literature on transdisciplinary collaboration and the practical requirements of project managers operating in complex multistakeholder environments.

Nevertheless, the proposed toolkit remains at an early stage of development. The current paper presents its initial logic, structure, and measurement-informed basis, but does not yet provide full empirical validation. A next step will be to use the ReCure-2 project as an early practical context for further testing, refining, and validating selected toolkit components. In this sense, ReCure-2 will not only serve as a first application context but also guide the continued research and iterative development of the toolkit in practice. Over time, this should strengthen its relevance and usefulness for innovation management in transdisciplinary project environments.

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Appendix

Appendix A. Literature-derived key criteria and example measurement approaches.

Key criterion	Example measurement approaches in literature	Example sources	How this informed operationalization
Shared Values	Value-fit surveys; coded reflections on shared ethical commitments	Kristof, 1996; Fazez et al., 2018; Polk, 2015	Informed prompts in the Project Values section of the charter and reflection items in the alignment assessment
Aligned Goals	Goal-congruence items; review of project agreements and written objectives	Lang et al., 2012; Bergmann et al., 2021	Informed Project Goals & Why It Matters, Project Focus, and alignment assessment items on shared direction
Motivation & Engagement	Engagement scales; participation/attendance indicators; longitudinal tracking	Ayala-Orozco et al., 2018	Informed prompts about why stakeholders are involved and alignment items related to commitment and participation
Shared Leadership	Leadership scales; governance indicators; decision-making structures	Arnold et al., 2000; Hail et al., 2018	Informed Governance & Decision-Making in the charter and alignment assessment items on shared leadership
Dynamic Roles	Role-clarity instruments; documentation of role transitions	Katz & Kahn, 1978; Dehla & Di Giulio, 2018	Informed Project Collaborators and role-related questions in the charter and assessment
Adaptability	Reflexivity scales; documented adaptive changes	West, 2000; Schippers et al., 2007	Informed reflection-oriented prompts and assessment items related to adapting to change
Project Management	Milestone tracking; deliverable indicators; stakeholder satisfaction	Frefer et al., 2018; Lamprou & Vagiona, 2022	Informed Timeline & Milestones, Constraints, and items related to structure and coordination
Resilience & Perseverance	Indicators of recovery from setbacks; continuity over time	Fazez et al., 2018; Bergmann et al., 2021	Informed prompts and items on handling setbacks and maintaining momentum
Co-creation	Creativity scales; counts of prototypes/experiments; evidence of joint outputs	Amabile et al., 2018; Lang et al., 2012	Informed prompts about how collaboration produces new ideas and joint contributions
Trust & Psychological Safety	Trust scales; Psychological Safety Scale	Edmondson, 1999; Hail et al., 2012	Informed alignment assessment items and assumptions around communication and openness
Semantic & Cultural Understanding	Intercultural competence tools; cohesion items; structural diversity indicators	Ayala-Orozco et al., 2018; Mauer et al., 2013	Informed the Collaboration Glossary, assumptions prompts, and alignment items on mutual understanding

Note: This table summarizes the 11 key criteria for successful transdisciplinary collaboration together with example measurement approaches identified in the literature and indicates how these informed their later operationalization in the proposed toolkit.

Appendix B. Translation of measurement approaches into practical toolkit components.

Type of measurement approach	What it assesses	How it was adapted for this study	Resulting toolkit component
Value-fit / shared values measures	Degree of ethical or motivational alignment	Reframed into accessible reflection prompts	Charter: Project Values
Goal-congruence measures	Shared understanding of project aims	Reworded into planning and reflection questions	Charter: Project Goals & Why It Matters; Project Focus
Leadership / governance measures	Shared leadership, influence, decision-making	Adapted into prompts on decision structures and leadership roles	Charter: Governance & Decision-Making; alignment assessment
Role-clarity measures	Clarity of responsibilities and expectations	Adapted into stakeholder mapping and role prompts	Charter: Project Collaborators
Reflexivity / adaptability measures	Willingness to reflect and adapt	Adapted into assessment items and refinement logic	Alignment Assessment; Refine phase
Project management indicators	Milestones, structure, coordination	Adapted into prompts about planning and constraints	Charter: Timeline & Milestones; Constraints
Trust / psychological safety scales	Openness, risk-taking, reliability	Rephrased into stakeholder-friendly assessment items	Alignment Assessment
Intercultural / semantic understanding tools	Shared meaning across disciplinary/cultural difference	Adapted into prompts and glossary-building	Collaboration Glossary; alignment assessment

Note: This table shows how literature-derived measurement approaches were adapted into practical prompts, reflection questions, and assessment items that informed the development of the toolkit components.

Appendix C. Four-phase structure of the proposed transdisciplinary collaboration toolkit.

Phase	Purpose	Main tools	Main criteria supported	Main output
Plan	Establish a shared foundation before or at project start	Problem Statement; Impact Statement; TD Collaboration Charter; Collaboration Glossary	Shared Values; Aligned Goals; Dynamic Roles; Shared Leadership; Project Management; Semantic & Cultural Understanding	Shared project foundation and initial alignment
Align	Assess how stakeholders perceive the collaboration in practice	Collaboration Alignment Assessment	All 11 criteria, especially Trust, Goals, Roles, Leadership, Motivation, and communication-related criteria	Initial alignment profile across stakeholders
Check	Monitor how alignment evolves over time	Repeated Collaboration Alignment Assessment	Adaptability; Resilience; Motivation; Trust; Project Management; Role clarity	Updated understanding of alignment shifts
Refine	Address gaps and recalibrate collaboration	Revisit charter, glossary, problem and impact tools	Criteria showing lower alignment or divergence	Revised collaboration foundation and improved alignment

Note: This table provides an overview of the Plan, Align, Check, and

Refine phases of the toolkit, including the purpose of each phase, the main tools used, the key criteria supported, and the expected outputs.

Appendix D. Toolkit components and their contribution to operationalizing the key criteria.

Toolkit component	Main purpose	Main sections/components	Criteria most directly operationalized
Problem Statement	Creates shared understanding of the problem and boundaries	Problem; causes; consequences; scope	Aligned Goals; Co-creation, Semantic & Cultural Understanding
Impact Statement	Clarify intended impact and assumptions	Impact hypothesis; assumptions; validation plan	Shared Values; Aligned Goals; Motivation; Adaptability
TD Collaboration Charter	Make core collaboration conditions explicit	Goals; values; focus; context; constraints; collaborators; governance; timeline; assumptions; risks	Shared Values; Aligned Goals; Shared Leadership; Dynamic Roles; Project Management; Resilience
Collaboration Glossary	Build shared language across backgrounds	Key terms; definitions; evolving terminology	Semantic & Cultural Understanding; Trust; Co-creation
Collaboration Alignment Assessment	Diagnose stakeholder perceptions of alignment	Likert-style items grouped by criterion	All 11 criteria
Refine stage	Use feedback to recalibrate the collaboration	Revisit earlier tools based on assessment results	Adaptability; Resilience; Project Management; Aligned Goals

Note: This table maps the main toolkit components to their purpose, key sections, and the criteria they most directly operationalize within the proposed transdisciplinary collaboration toolkit.

Appendix E. Market scan of selected collaboration tools, frameworks, and platforms compared to the proposed transdisciplinary collaboration toolkit.

Tool / Framework	Comparable to proposed toolkit	Plan	Align	Check	Refine	Usefulness	Ease of Use	Fit for Purpose	Notes
Is-net Toolkit	Whole toolkit (partial)	✓	✓	x	x	High	Medium	Medium	Strong method base but fragmented
Strategies	Whole toolkit (partial)	✓	✓	x	x	High	Medium	Medium	Very broad but not structured
SHARED Toolkit	Whole toolkit (partial)	✓	✓	x	x	High	Medium	Medium	Phase-based but not iterative
Integrated Research Toolkit (IR2)	Whole toolkit (partial)	✓	✓	--	x	High	Medium	Medium	Closer to phased logic
Transdisciplinary Design Toolkit (Molinero-Ruiz)	Whole toolkit (partial)	✓	✓	--	x	Medium	Medium	Medium	Similar phase logic but different aim
Team Canvas	TD Collaboration Charter	✓	✓	x	x	High	High	High	Strong for workshops
Team Charter Frameworks (Barton & Susman; Siders)	TD Collaboration Charter	✓	✓	x	x	High	Medium	High	Most direct comparison to your Charter
Project Alignment Explorer (Lal et al.)	TD Collaboration Charter / whole system	✓	✓	--	x	High	Medium	High	Closest structural match
Theory of Change / Logic Models	Impact Statement	✓	✓	--	x	High	Medium	High	Strong conceptual tool
HAZCA	Alignment Assessment	x	✓	✓	x	High	Medium	High	Strong psychometric basis
Collaboration Readiness Tools (Hail et al.; Bube et al.)	Alignment Assessment	x	✓	✓	x	High	Medium	High	Widely validated
Wise / Hara	All tools (format only)	✓	✓	--	--	High	High	Medium	Tool, not framework
Adaptation Team Playbook	Whole toolkit (partial)	✓	✓	✓	--	High	High	Medium	Has check-ins but not systematic
TeamBots / Parabot	Alignment Assessment / Check phase	x	✓	✓	✓	High	High	High	Strong on iteration only
TD Collaboration Toolkit	--	✓	✓	✓	✓	High	High	High	Integrated Plan-Align-Check-Refine cycle; includes assessment, glossary, and re-alignment loop.

Note: This table presents an exploratory comparison of existing approaches to determine the extent to which they support functions similar to the Plan–Align–Check–Refine phases of the proposed toolkit, and to highlight areas where the proposed toolkit offers a more integrated and iterative alignment process. Entries were positioned using academic publications where available and official toolkit or platform pages for named resources and software products.