



Transdisciplinary and International Collaboration in Disaster Research: A Procedural Model Approach

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Abstract Transdisciplinary and international collaboration has become increasingly central to disaster research, yet its organizational and institutional dynamics remain insufficiently understood. Based on insights from a four-year international research project on integrated disaster risk management, this paper examines the cultural and institutional dimensions of such collaboration. Drawing on empirically grounded evidence from documentation, workshops, and reflective exchanges, the study introduces a procedural model tailored to disaster research that captures how collaborative processes evolve through phases of exploration, negotiation, and construction. Findings highlight the role of cultural and contextual factors in shaping research dynamics—particularly the influence of work cultures, communication norms, and funding asymmetries between partners. The paper also underscores the challenge of integrating local and practical knowledge into research processes, noting that current funding schemes rarely enable the participation of non-scientific or community partners in early project phases. Adaptability, reflexivity, and continuous learning emerged as key mechanisms for sustaining collaboration under conditions of uncertainty, including political instability and global crises such as the COVID-19 pandemic. The resulting procedural model contributes to a better understanding of how transdisciplinary and intercultural cooperation can be organized and managed by explicitly addressing uncertainty and cyclicity as inherent and productive features of international disaster research.

Keywords: transdisciplinarity, international collaboration, disaster research, disaster risk management, procedural model

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1. INTRODUCTION

Recent scholarship has emphasized the need for a more nuanced understanding of the evolving relationship between the Global North and the Global South. Gillespie and Mitlin (2023) argue that convergence and divergence processes within global development and inequality contexts are complex and multidimensional, cautioning against simplistic North–South dichotomies. Similarly, Horner and Hulme (2019) highlight that economic convergence alone does not guarantee social or environmental progress. Instead, they call for broader perspectives that incorporate social justice, environmental sustainability, and cultural diversity (Gillespie & Mitlin, 2023; Horner & Hulme, 2019). These discussions reveal that development processes are deeply context-dependent. Policies and frameworks effective in one region may be ineffective—or even counterproductive—in another. Consequently, integrating local knowledge and practice through transdisciplinary research and equitable international collaboration has become essential. At the same time, growing attention to the power dynamics between the Global North and South underscores the need to recognize the agency of Southern partners and to foster genuine, mutually beneficial research partnerships.

This recognition is particularly relevant in the field of disaster research and practice. Contemporary debates around Integrated Disaster Risk Management (IDRM), systemic risk, multi-hazard research, and cascading effects stress the interdependence of social, ecological, and technical systems (Sandoval et al., 2023; UNDRR, 2023). At the same time, disaster risk scholars have emphasized the need for more integrated and transdisciplinary approaches capable of bridging disciplinary, institutional, and societal boundaries in risk research and practice (Gall et al., 2015). Recent work has further highlighted the importance of iterative and collaborative frameworks that combine knowledge co-production, risk governance, and adaptive learning processes (Parviainen et al., 2025). Addressing such complexity requires not only scientific and technological innovation but also procedural frameworks that enable collaboration across disciplines, sectors, and cultural boundaries.

Against this background, this paper draws on the experience of the German–Iranian research project INCREASE—Inclusive and Integrated Multi-Hazard Risk Management and Engagement of Volunteers to Increase Societal Resilience in Times of Climate Change—as an empirically grounded basis for introducing a procedural model for transdisciplinary and international collaboration in disaster research. Funded by the former German Federal Ministry of Education and Research (BMBF), INCREASE brought together around twenty partner organizations from science, technology, and practice in Germany and Iran. The project aimed to promote scalable, multi-sectoral, and risk-sensitive disaster risk management approaches, addressing themes such as risk governance, emergency response, and the socio-cultural dimensions of resilience and adaptation. However, the collaboration faced significant challenges due to the economic, political, and cultural divergence between both countries. These differences made the INCREASE project a valuable case through which to explore how transdisciplinary and international cooperation can be practically organized and sustained in the context of unequal and diverse global relations.

This paper addresses the question of how transdisciplinary and international disaster research collaborations can be organized, sustained, and adapted under conditions of cultural diversity, institutional asymmetry, and contextual uncertainty. The objective of this paper is therefore twofold: first, to critically examine the processes and challenges that shape transdisciplinary collaboration in international disaster research, particularly in Global North–South partnerships, based on the case study; and second, to introduce a procedural model, developed and refined over the course of the project, that conceptualizes how such collaborations operate and evolve over time. The model is based on both the authors’ personal experiences and an extensive analysis of project documentation, including meeting minutes, synthesis reports, and other outputs collected over the four-year period from 2021 to 2025. Rather than assessing outcomes, the focus lies on the processes that enable or hinder collaboration that is both effective and sensitive to the heterogeneous working conditions of all participants.

The next section outlines the methodological approach, detailing the data sources and analytical framework. Subsequently, we introduce the theoretical foundations, reviewing key concepts of transdisciplinarity, integration, and collaboration, including relevant perspectives from Latour. Then, we present the INCREASE project as a case study, examining collaborative practices, tools, and challenges encountered during implementation. After that, we discuss the resulting procedural model, which synthesizes lessons learned from this collaboration. Finally, the conclusion reflects on the broader implications of the model for future transdisciplinary and international disaster research initiatives.

2. METHODOLOGY: MATERIALS AND METHODS

This study employs a qualitative, interpretive, and exploratory approach aimed at understanding the procedural dynamics of transdisciplinary and international collaboration in disaster research. The analysis focuses on examining how collaboration practices evolve and adapt within complex socio-political and cultural environments. The methodological design combines three complementary elements: an exploratory literature review, qualitative document analysis, and reflexive inquiry informed by the authors’ professional experience. Likewise, the analysis is explicitly grounded in an intersubjective interpretive perspective, in which meaning is constructed through iterative reading, comparison, and reflexive engagement with empirical materials rather than through hypothesis testing or standardized coding procedures (Forino et al., 2025; Uekusa, 2024).

The literature review followed an iterative process based on snowball sampling and relevance-driven inclusion of sources (Green et al., 2006; Snyder, 2019). This strategy was selected to capture conceptual depth across debates on transdisciplinarity, collaboration, and Global North–South relations—both within disaster research and more broadly—rather than to achieve the exhaustiveness of a systematic review. The review drew on key works (e.g., Gillespie & Mitlin, 2023; Horner & Hulme, 2019) and expanded through citation tracing and thematic clustering. Empirical materials were drawn primarily from the INCREASE project, including 41 meeting minutes (March 2021–January 2025), 13 synthesis reports (three annual

summaries and ten workshop or webinar reports), and complementary project outputs such as conference papers, peer-reviewed publications, and internal working documents. To enhance analytical transparency, Table 1 summarizes the main empirical sources and their relationship to the thematic categories that informed the analysis and findings. All materials were analyzed manually through an inductive and iterative reading process informed by principles of qualitative content analysis (Bowen, 2009; Mayring, 2015). Analytical notes were recorded systematically to identify patterns, tensions, and practices of collaboration across institutional, disciplinary, and national boundaries. The use of MAXQDA served as an organizational aid rather than a mechanical coding device, with analytical interpretation remaining theory-informed and reflexive. Document analysis enabled the identification of both formal procedures and subtle dynamics of interaction, including negotiation, communication, and trust-building, that characterize transdisciplinary and cross-cultural cooperation (Bowen, 2009).

Table 1. Study’s analytical themes and empirical material used during analysis

Analytical themes	Main empirical sources
Contextual conditions	Meeting minutes, annual reports, workshop reports
Communication	Meeting minutes, communication strategy, workshop reports
Interculturality	Intercultural workshop reports, meeting minutes, reflexive notes
Interdisciplinarity	Workshop reports, publications, project meetings
Coordination	Meeting minutes, project descriptions, annual reports
Data sharing	Monthly meetings, data management documents
Integration of results	Publications, reports, conference outputs

Source: Authors, 2026

The interpretation of these materials was complemented by reflexive inquiry (Alvesson et al., 2018; Finlay, 2002), explicitly acknowledging the authors’ positionality, power relations, and extensive collective experience of over three decades in international cooperation and disaster research. Our approach is consistent with recent calls in disaster studies to employ reflexivity as a means of strengthening interdisciplinary collaboration, critically examining positionality, and making knowledge-production processes more transparent (Forino et al., 2025; Uekusa, 2024).

The authors come from diverse disciplinary backgrounds—sociology, urban planning, and geography—and combine academic training, professional practice, and lived experience across several countries in the Global North and the South. Reflexive discussions and internal memos were used to examine how these positions shaped data interpretation and model construction, particularly in relation to leadership, coordination, and knowledge integration. Notably, the authors’ institutional location within the German partner organizations—including one project leader and two senior researchers—introduced asymmetries of influence vis-à-vis Iranian partners, which informed how coordination challenges, decision-making processes, and interpretations of collaboration were understood and represented in the model. While this positionality enabled privileged access to project documentation and strategic discussions, it also required continuous reflexive scrutiny to avoid normalizing dominant perspectives. These dynamics are therefore treated as both an analytical resource and a limitation of the study.

Reflexivity served not as personal narrative but as an interpretive lens through which collaborative processes were contextualized and critically examined (Alvesson et al., 2018). Notes and interpretive memos were kept during the analysis to interrogate assumptions and to triangulate insights between empirical documentation and experiential understanding. The synthesis of findings followed the logic of thematic synthesis (Braun & Clarke, 2006), combining insights from the literature review, document analysis, and reflexive reflections. This iterative process culminated in the formulation of a procedural model that synthesizes the dynamics of transdisciplinary and international research collaboration within the INCREASE project. The model reflects how collaborative processes were initiated, negotiated, and adapted over time in response to changing contextual, cultural, and institutional conditions. While qualitative and interpretative in nature, the study maintains analytical rigor through the use of multiple data sources, including project documentation, meeting records, synthesis reports, and reflective notes, combined with systematic reflexivity. In sum, the model represents an empirically grounded reconstruction of collaborative practice, illustrating how learning, adaptation, and contextual sensitivity shaped the project's transdisciplinary work.

3. TRANSDISCIPLINARITY, INTEGRATION, AND COLLABORATION

In recent decades, growing societal challenges—such as climate change and disaster risks—have intensified calls for science to engage more directly with other sectors of society. Addressing such complex problems requires cooperation among diverse actors from policy, practice, and academia. This demand has inspired a range of participatory and collaborative approaches, including participatory research, citizen science, and living labs (Veeckman & Temmerman, 2021; von Gönner et al., 2023). The INCREASE project builds on these traditions, applying principles of transdisciplinarity, integration, and collaboration to disaster research.

Transdisciplinarity has become particularly influential within sustainability and environmental research, where it is recognized as a distinct research mode (Lawrence et al., 2022). It seeks to bridge the gap between scientific and non-scientific domains by involving stakeholders from different sectors—politics, business, civil society, education, and the arts—alongside academic disciplines. In contrast to applied research conducted for external actors, transdisciplinary research is conducted with them. It ideally begins with a joint definition of the problem, proceeds through coordinated and collaborative inquiry, and concludes with results that are meaningful to all participants. The added value lies in this co-production of knowledge, where diverse perspectives serve as sources of both creativity and critical reflection. In Global North–South collaborations, these principles are often complicated by asymmetries in resources, institutional capacities, political contexts, and knowledge traditions, making integration and collaboration both more challenging and more necessary (Horner & Hulme, 2019; Gillespie & Mitlin, 2023).

Although transdisciplinary research is sometimes questioned for its scientific independence or its alignment with societal interests, leading German research institutions—such as Freie Universität Berlin, Technische Universität Berlin, and the Karlsruhe Institute of Technology

(KIT)—have formally integrated transdisciplinarity into their research strategies. Likewise, national and international funding bodies increasingly encourage transdisciplinary approaches as a means to address complex, real-world problems (Deutsche Forschungsgemeinschaft, 2025; Manuel-Navarrete et al., 2025). These developments suggest that scientific quality and societal relevance can reinforce rather than contradict each other.

The INCREASE project introduced an additional layer of complexity: intercultural collaboration. Beyond disciplinary diversity, the partnership between German and Iranian institutions required navigating cultural, political, and institutional differences. This dimension exemplifies one of transdisciplinarity's key characteristics—its project-specific nature. Because every societal problem emerges within unique social and contextual conditions, each transdisciplinary project must be tailored to its participants, objectives, and environment.

This section is organized in four parts. First, it outlines key conceptual developments of transdisciplinary research provided in recent literature, from which practical requirements for collaborative projects can be derived. Second, it identifies essential elements of integration and collaboration in transdisciplinary and international contexts. Third, it draws on ideas from Bruno Latour to interpret integration and collaboration as relational processes rather than fixed structures. Finally, it synthesizes these insights into preliminary ideas for a procedural model of transdisciplinary and international cooperation, grounded in the empirical experiences of the INCREASE project. The aim is to distill practical lessons from the consortium's four years of collaborative work and to contribute to the conceptual debate while supporting future efforts in international and transdisciplinary disaster research.

3.1 Conceptual Phases of Transdisciplinarity

In general terms, the literature on transdisciplinarity outlines how projects should ideally progress to qualify as truly 'transdisciplinary,' and it often serves as a starting point for developing project-specific frameworks. In the case of the INCREASE project, the adopted process model incorporates intercultural dimensions as an inherent part of its transdisciplinary orientation. It not only considers the procedural course of the project and the evaluation of outcomes but also emphasizes conditions that enable effective cooperation among partners from different disciplinary (interdisciplinary), practical (transdisciplinary), and cultural backgrounds.

Concepts of transdisciplinary processes (Jahn et al., 2012; Lam et al., 2021; Lang et al., 2012) generally share a comparable three-phase structure that emerged from related research contexts in sustainability and integrative science (Figure 1). The first phase focuses on joint problem framing and team formation, emphasizing the co-definition of goals and research questions. The second phase concerns the conduct of the research—“the actual doing of research” (Lang et al., 2012, p. 28)—which includes data collection, analysis, and continuous communication among scientific and non-scientific actors. The third phase addresses the synthesis, dissemination, and implementation of results in both scientific and societal contexts. These concepts, however, are not rigid blueprints but ideal-typical frameworks. Their

application varies depending on the project's specific context, actor constellation, and institutional setting. Transdisciplinary research is inherently iterative: feedback loops occur across all phases, allowing for reflection, adaptation, and mutual learning throughout the process. Other feedback loops reflect how scientific outputs (e.g., concepts, methods, models) and societal effects (e.g., policy uptake, institutional change, crisis events) recursively influence subsequent problem framings, research practices, and collaboration structures, thereby reshaping both knowledge production and project governance over time. This iterative dynamic underscores that transdisciplinarity is less a linear method and more an evolving, context-sensitive mode of knowledge co-production (Bergmann et al., 2012; Pohl & Hirsch Hadorn, 2008). The procedural model developed for the INCREASE project builds on these theoretical foundations.

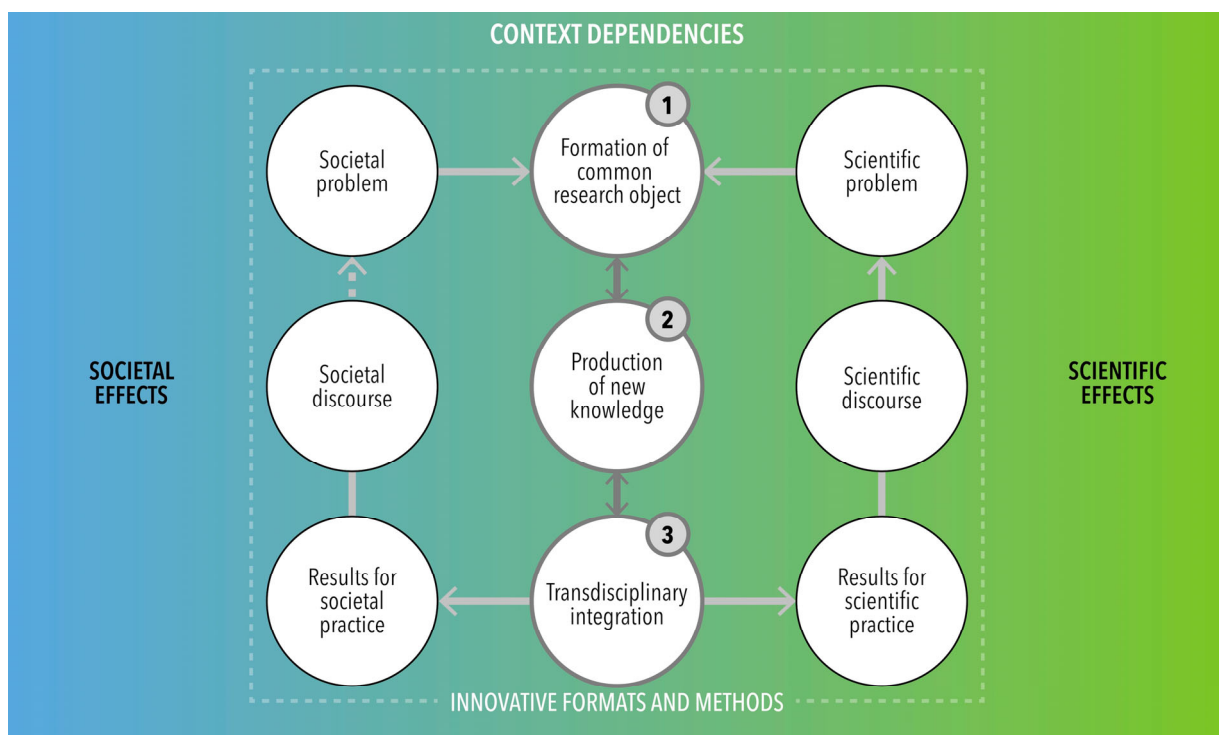


Figure 1. Authors' version of a process model by Lam et al. (2021)

Source: Authors, 2026

3.2 Elements for Transdisciplinary and International Research Projects: Integration and Collaboration

Beyond the structural phases of a procedural model, transdisciplinary projects face specific challenges related to integration and collaboration among diverse partners. Waag (2012) emphasizes that integration must occur across all project phases—from problem framing to results—through iterative cooperation and mutual learning. Building on this understanding, the INCREASE project adopted and adapted integration and collaboration principles identified in transdisciplinary and international research.

Lang et al. (2012) propose a comprehensive framework for designing transdisciplinary sustainability research, outlining principles for all phases of collaboration. These include joint

problem framing, establishing a shared understanding of goals and boundaries, and designing a methodological framework for co-production and integration of knowledge. In later phases, attention shifts to applying integrative methods, supporting diverse roles among researchers and practitioners, and evaluating both scientific and societal outcomes. Continuous reflection, conflict mediation, and the fostering of participatory capabilities are seen as crucial across all stages. The INCREASE project adopted these principles early on through co-defined work plans, role allocation, and regular integrative workshops, where partners from different backgrounds co-developed outputs ranging from peer-reviewed papers to policy briefs and reports. Regular meetings further enabled reflexive discussions on the project's process and impacts.

Integration in transdisciplinary research extends beyond temporal phases. Bergmann et al. (2010) identify three essential dimensions: communicative, social-organizational, and cognitive-epistemic. Communicative integration requires establishing a shared language—both literally and conceptually. In INCREASE, English functioned as the working language between German and Iranian partners, while early workshops were devoted to aligning conceptual understandings of key terms such as ‘risk,’ ‘disaster,’ and ‘integration.’ Social-organizational integration was fostered through joint structures, while cognitive-epistemic integration emerged through shared conceptual and analytical frameworks. These dimensions remained ongoing challenges throughout the project lifecycle.

Insights from ‘real-world labs’ (Defila & Di Giulio, 2018, 2019) also informed INCREASE’s approach. Such labs emphasize the importance of developing actor typologies that clarify the roles, expectations, and contributions of different participants. For INCREASE, actors were categorized by expertise (scientific, governmental, civil society, and market) and by national affiliation (Germany and Iran). This typology helped structure collaboration and identified hybrid institutional characteristics, such as the German Federal Agency for Technical Relief (THW), which combines state and volunteer roles.

From a participatory perspective, Alcántara et al. (2018) distinguish between neoliberal, functional, deliberative, and emancipatory participation models. INCREASE primarily reflects a functional form of participation—focused on expert collaboration—while incorporating deliberative elements of mutual recognition across professional and cultural boundaries. In contrast to mainstream approaches that prioritize consensus, Maasen (2019) advocates for ‘cooperation through difference,’ emphasizing active dialogue and listening over mere agreement. Following this, INCREASE conceptualized integration as a dynamic process grounded in acknowledging difference as a productive resource rather than an obstacle to collaboration.

3.3 Integration and Collaboration with Bruno Latour

Interpreting transdisciplinary collaboration through a procedural lens (Lorenz, 2010, 2022) allows the structuring of integration and cooperation along specific project phases. This approach draws inspiration from Latour’s (2004) model of the ‘parliament of things,’ which

outlines seven procedural stages, each linked to particular tasks, competencies, and responsibilities among various actors.⁴ Latour distinguishes between different ‘professions’—such as scientists, economists, politicians, and moralists⁵—emphasizing that each contributes distinct forms of expertise to a collective process. Applied to transdisciplinary research, this implies that each project phase entails specific functions requiring the contributions of diverse actors whose competencies complement one another. Consequently, evaluation criteria for collaboration can be formulated as phase- and actor-specific questions: Have all procedural stages been completed? Have their respective tasks been fulfilled according to the required expertise?

Latour’s metaphor of the construction site further illuminates the collaborative dimension of transdisciplinary work. In this metaphor, the ‘building’ represents a shared outcome that can only emerge through the differentiated yet coordinated efforts of multiple actors. The quality of the construction depends on the effective interplay between these heterogeneous contributions—no single actor or discipline can claim ownership of the process. From this perspective, the expression ‘transdisciplinary research’ can be seen as somewhat misleading, since not all participants engage in ‘research’ in the strict scientific sense. Instead, each fulfills a distinct but interdependent function: scientists investigate, policymakers deliberate and decide, entrepreneurs calculate, artists visualize, and civil society actors contribute normative or ethical perspectives, for example. Together, these activities form an ‘assemblage of practices’ that, through coordination and reflexive communication, generate integrative and socially relevant outcomes.

Ultimately, this Latourian perspective reframes transdisciplinary integration as a collective learning process shaped by cooperation, differentiation, and communication. It highlights that the essence of collaboration lies not in dissolving disciplinary or professional boundaries but in organizing them productively around a shared problem. Integration, therefore, becomes a procedural achievement—the result of sustained interaction among actors with diverse competencies who contribute to a common endeavor while retaining their distinct epistemic and practical identities.

3.4 Preliminary Ideas for the Development of a Procedural Model

Building on the mentioned discussions of transdisciplinarity, integration, and international collaboration, and drawing on the procedural perspective developed by Lorenz (2010, 2022), the development of a procedural model for transdisciplinary and international collaboration requires an approach that does not privilege scientific practice over other forms of social engagement but rather provides a shared framework for all participants. Drawing on procedural theory (Lorenz, 2010, 2022) and phase models from transdisciplinary research (Jahn et al., 2012; Lang et al., 2012), the model adopted and refined throughout the mentioned four-year

⁴ The preceding phase model in the actor-network theory tradition was provided by Callon (1986).

⁵ Latour (2004), in his concept of the ‘parliament of things’, conceives of civil society actors as ‘moralists’; with reference to this, we use ‘moralize’ here, although this is certainly too narrow a categorization, and in any case one that requires further explanation.

project conceptualizes collaboration as an iterative and reflexive process that unfolds across three core phases—(Re-)Opening, Testing/Selecting, and Closing—accompanied by continuous reflective learning. This cyclical structure ensures that project activities remain open to reinterpretation and redefinition based on collective learning. As Jahn et al. (2012, p. 7) note, each iteration of a transdisciplinary process begins “with a modified understanding or framing of the initial problem.” Documentation of each iteration is therefore crucial, as it enables future cycles to build on accumulated insights and to institutionalize learning within the consortium. In this sense, the model conceptualizes transdisciplinary collaboration not merely as a research design but as an evolving social learning process that integrates scientific, practical, and intercultural dimensions (see Figure 2 as an example).

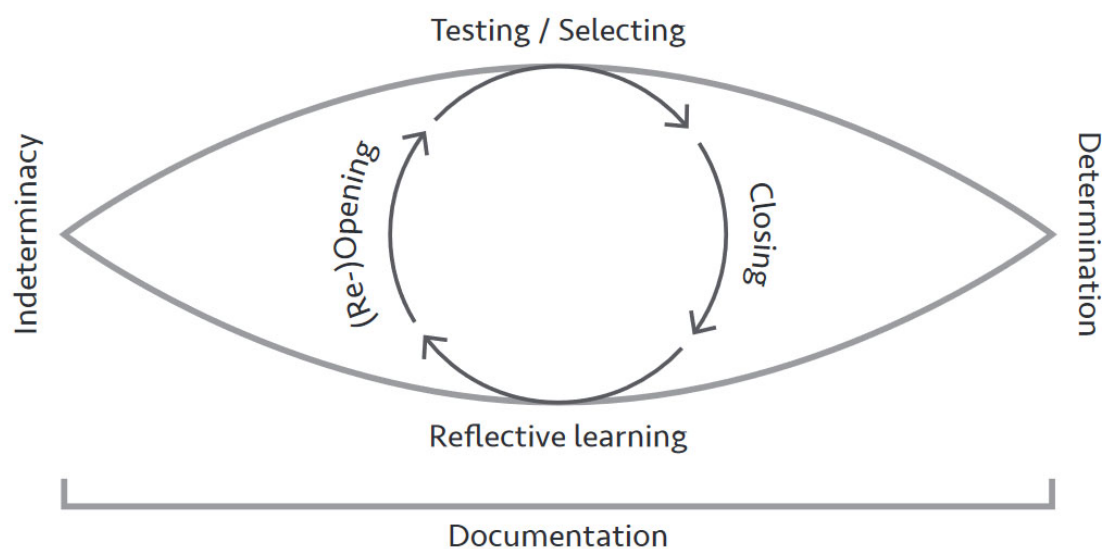


Figure 2. The ‘Procedural Eye’ – A General Model of Procedures and Procedural Learning
Source: Lorenz (2022), modified from Lorenz (2010)

At the same time, the procedural perspective acknowledges the differentiated roles and interests of participating actors. While scientific actors retain a certain conceptual responsibility in framing the research—clarifying their methods and contributions—effective collaboration requires recognizing the equal relevance of non-scientific perspectives. As Maasen (2019, p. 105) argues, collaboration should not rely on artificial consensus or ‘shared values,’ but rather on ‘informed dissent’: the productive engagement with difference across disciplines, sectors, and cultures. This conception aligns with pragmatist understandings of action as problem-solving (Dewey, 1938), in which each social field—science, politics, economy, or civil society—approaches shared challenges through distinct logics, values, and criteria of success. Cooperation thus becomes an exercise in negotiating and integrating these heterogeneous forms of reasoning. As Sennett (2012, 2018) emphasizes, such cooperation depends on cultivating respect for diversity and creating spaces where difference can be traded productively rather than suppressed. Consequently, the procedural model developed in this work conceives transdisciplinary collaboration as a pluralistic and reflexive process of collective problem-solving, grounded in continuous learning, documentation, and communication. The following section applies these considerations to the empirical case of the INCREASE project, illustrating how such a model can be operationalized in practice.

4. COLLABORATION IN THE INCREASE CONSORTIUM: PRACTICE AND TOOLS

Building upon the theoretical considerations discussed earlier, the INCREASE project developed a learning-oriented procedural model for fostering transdisciplinary and intercultural collaboration. This framework was not only designed as an abstract concept but was progressively ‘filled’ through practical experience and reflection. Over the project’s course, a variety of methods and tools were devised, tested, and refined to operationalize the model within real research contexts. These included approaches for dialogue facilitation, communication platforms, and structured exchanges that supported both project management and learning processes. The emphasis was less on achieving conceptual uniformity than on enabling productive interaction across epistemic and cultural differences.

To approach this development, the project’s consortium drew upon three complementary sources: relevant literature, external and intercultural exchange, and existing cooperation practices. Foundational works such as Bergmann et al. (2010, 2012) and Defila and Di Giulio (2018, 2019) provided methodological insights into transdisciplinary collaboration. However, while the literature often emphasizes consensus and shared understanding, INCREASE deliberately prioritized the productive handling of difference as a key principle (Maasen, 2019). Rather than forcing agreement on central notions like ‘risk,’ ‘disaster,’ or even ‘research,’ the project encouraged participants to build conceptual ‘bridges’ and ‘translations’ across disciplinary and cultural framings. The goal was to sustain dialogue despite asymmetries and disagreements—aligning with the view that transdisciplinarity thrives not on sameness but on negotiated difference.

External engagement and intercultural exchange also played crucial roles. INCREASE partners participated in conferences, workshops, and networks—such as the recently concluded tdAcademy (<https://td-academy.org/>), followed by the association ‘Gesellschaft für transdisziplinäre und partizipative Forschung e.V. (GTPF <https://www.gtpf.science/>), integrating broader reflections on cooperation and risk governance. A key milestone was the intercultural training workshop (October 2021) that gathered German participants to strengthen cross-cultural communication, foster awareness of divergent professional norms, and improve conflict resolution skills. Hence, INCREASE built upon pre-existing cooperative ties among partners, integrating established tools and communication practices—from digital platforms (e.g., Mendeley, Box.FU) and IT security protocols to regular meetings and engagement with networks such as the Integrated Disaster Risk Management (IDRiM) Society. Yet, beyond tools, what proved decisive was the continuous reflection on cooperation itself—how partners communicated, negotiated expectations, and adapted methods to their specific contexts. This recursive dialogue became both a mode of governance and a learning mechanism, embodying the project’s procedural model in practice.

Thus, this section therefore serves a dual purpose: first, to describe how the INCREASE project was conceived and implemented in practice; and second, to identify the principal challenges and experiences that informed the development of the procedural model presented

later in this paper. Particular attention is given to the interaction between intended project structures, actual collaborative practices, and the contextual conditions that shaped their implementation.

4.1 Experiences and Challenges in Transdisciplinary and International Collaboration: An Overview from the INCREASE Project

Throughout the INCREASE project, a range of interconnected challenges emerged as central to sustaining transdisciplinary collaboration. These included contextual conditions, communication and common language, interculturality, interdisciplinarity, coordination, data sharing, and the integration of results. Each required continual negotiation, adaptation, and learning, reflecting the fluid nature of transdisciplinary work where project dynamics and external developments continuously reshape both goals and methods.

‘Contextual (rapidly changing) conditions’ proved especially decisive and can be understood as part of a broader assemblage of institutional, political, and material actors that shaped collaboration in practice. These conditions encompassed structural and institutional factors such as the recognition of transdisciplinarity, funding mechanisms, and administrative or political frameworks in each country. In Germany, transdisciplinary research benefits from growing institutional legitimacy, supported by established academic infrastructures, funding schemes, and policy networks that stabilize long-term engagement. In Iran, by contrast, transdisciplinarity remains less institutionally embedded, and its recognition within academic and policy systems is more limited. These differences translated into asymmetric capacities to act within the collaborative network: German institutions benefited from four years of BMBF funding (2021–2025), while Iranian partners—excluded from direct access to German funding—were required to mobilize alternative resources, often with limited success. In Latourian terms, funding arrangements, administrative rules, and political constraints operated as non-human actors that redistributed agency unevenly across the consortium, affecting participation, project continuity, and access to basic collaboration tools.

External geopolitical and societal developments, with the COVID-19 pandemic as background, further complicated the collaboration. The war of Russia on Ukraine, the protests in Iran following Mahsa Amini’s death, and the escalating situation in Gaza disrupted international exchanges, delayed events, and strained communication. In parallel, ongoing sanctions against Iran created practical obstacles—from knowledge transfers and academic visits to the organization of joint activities. These crises underscored the fragility of international research under conditions of political volatility and uneven mobility. Yet, they also revealed the resilience of transdisciplinary cooperation: partners adapted by relying on digital platforms, maintaining consistent communication, and prioritizing trust and transparency in their interactions.

The funding asymmetry in the INCREASE project—where only German partners received direct financial support—had far-reaching implications for collaboration. German institutions benefited from secure resources, equipment, and administrative capacity, while Iranian partners

operated under severe financial and logistical constraints that limited their ability to contribute on equal terms. This imbalance translated into difficulties covering travel costs, organizing events, and hiring personnel. Although frustration occasionally arose among German partners due to the resulting inefficiencies, the structural inequality primarily burdened the Iranian side, who had to rely on informal arrangements and the goodwill of their counterparts. The unequal access to resources also reinforced power asymmetries, with German partners assuming more prominent roles in decision-making. Hence, this gave them greater autonomy and freedom to pursue their work, while further constraining their Iranian colleagues' independence.

To manage these challenges, the consortium adopted several mitigating measures. The coordination team emphasized transparency, inclusive dialogue, and clearly structured communication. Early in the project, a communication strategy was developed outlining the use of emails, messaging channels, and online meeting formats. Regular 'monthly meetings' among German partners ensured participatory decision-making and collective oversight, while Iranian partners remained involved through bilateral coordination and virtual exchanges. Nonetheless, plans for broader capacity-building and joint training initiatives—meant to balance the uneven institutional conditions—were only partially realized. Worsening geopolitical relations between Germany and Iran (2022–2024), combined with growing administrative restrictions and funding barriers, prevented their full implementation. Efforts to secure additional financial support or to negotiate fairer funding arrangements with the German Federal Ministry of Education and Research (BMBF) also proved unsuccessful, reinforcing the structural dependence of Iranian partners.

The COVID-19 pandemic added another layer of complexity. Although anticipated during project planning in 2020, its long-term effects were underestimated, necessitating adjustments in activities and timelines. Travel restrictions and the absence of physical meetings hindered opportunities for exchange, mutual learning, and trust building—elements central to transdisciplinary research. Yet, the consortium responded with flexibility, moving interactions online and using digital formats to sustain dialogue. At the same time, disastrous events such as the 2021 floods in Germany and the Abadan building collapse in Iran stimulated thematic cooperation on integrated disaster risk management. These crises prompted rapid exchanges, including the WebTalk: German Flood Disaster (December 2021) and the Corona Workshop Series (2021–2022), where experts from both countries shared insights and reflections on resilience, risk, and governance. Ultimately, adaptability and reflexive learning proved critical for navigating uncertainty, allowing the consortium to maintain collaboration despite asymmetrical structures and external disruptions.

An essential aspect of transdisciplinary work is 'communication' and the establishment of a common language. Communication in intercultural collaborations entails technical, organizational, socio-cultural, and linguistic dimensions. English served as the project's *lingua franca* and scientific medium, enabling participants from different origins and institutions to engage. However, it also imposed certain limitations on expression. Early in the project, German partners agreed to use English as the main working language to ensure inclusivity for non-German speakers, while participants were also free to contribute in German. When needed, translations or clarifications were provided collectively. Challenges of coordinating

communication were recurrent throughout the project, as reflected in meeting minutes and annual synthesis reports.

Given the project's distributed structure—across German and Iranian subprojects with distinct work packages and timelines—maintaining regular exchange was crucial. Several mechanisms supported this process, including monthly coordination meetings among German partners and semestral or annual meetings with Iranian colleagues. While these were intended to alternate between both countries, contextual constraints such as the COVID-19 pandemic, political tensions, and travel restrictions limited them to Germany.

Coordinating communication also required continuous adaptation. Email and mailing lists were the main channels among German partners, while instant messaging services such as WhatsApp or Telegram were preferred by Iranian colleagues. Attempts to integrate these tools into formal project communication were ultimately discontinued due to security and privacy concerns. Other digital platforms, such as Webex or Zoom for videoconferencing and Doodle or Terminplaner for scheduling, were also affected by internet restrictions in Iran, sometimes forcing last-minute changes. Alternative options like proxy servers or VPNs were considered but ruled out due to potential risks for partners in both countries. These experiences underscored how infrastructural and political conditions shape the practical realities of collaboration in transnational research.

'Interculturality' is a crucial dimension of international and transdisciplinary work. Early in the project, differences between the Iranian and German calendars became evident. Weekends in Germany (Saturday–Sunday) did not align with those in Iran (Thursday–Friday), complicating meeting schedules and joint activities. Public and religious holidays also differed significantly: German holidays such as Christmas and Easter contrasted with Iranian observances like Nowruz and various Islamic holidays that follow a lunar cycle. To address this, a shared calendar was developed to map holidays, vacations, and working periods in both countries. This tool proved essential for coordinating meetings, deadlines, and milestones, helping maintain workflow continuity and mutual consideration. Beyond logistics, it also encouraged cultural awareness and respect, fostering a more cohesive working environment.

To deepen intercultural understanding, an intercultural training workshop on Iran was organized in 2021 for German partners. The workshop focused on exploring self- and foreign perceptions, and examined how Iran's historical, geopolitical, religious, and social contexts shaped its academic and research culture. It discussed the close interrelation between state, education, and science, as well as the influence of religion on academic life. Participants were invited to reflect critically on cultural assumptions and stereotypes, gaining insight into Iranian identity and its links to Islamic traditions. Practical aspects were also addressed, such as institutional procedures, time management, team collaboration, and etiquette in professional interactions—ranging from meeting conduct to awareness of holidays and religious customs. Language and communication challenges were revisited as part of this exchange. Overall, the workshop played a key role in strengthening mutual respect, trust, and the foundation for effective and empathetic international collaboration. Intercultural differences were repeatedly addressed during the 2021 intercultural workshop and revisited in subsequent reflexive notes.

‘Interdisciplinarity’ is another central component of transdisciplinary and international cooperation. Within the INCREASE project, it played a vital role in shaping and implementing the project’s objectives, given the diversity of disciplines involved—ranging from geosciences, engineering, and urban planning to sociology and human geography. Each field contributed distinct terminologies, methods, and perspectives on disaster research, which initially created communication challenges. Over time, however, these differences became complementary, enriching the collective understanding of multi-hazard risk management and societal resilience in the context of climate change. A key achievement of this interdisciplinary collaboration was the integration of qualitative and interpretive perspectives from the social sciences with quantitative and technical approaches from the natural and engineering sciences: during the final workshops and discussion rounds, a role-playing exercise and joint presentations were used to illustrate this. Qualitative insights were crucial for grasping local contexts and social dynamics in Germany and Iran, informing more inclusive and context-sensitive risk management strategies. This integration was particularly evident during the development of the Integrated Disaster Risk Management (IDRM) Framework and the IDRM Index (Voss et al., 2025). While the framework aimed at combining social and technical perspectives to guide systemic understanding of risks, the index aimed at merging statistical data with policy insights, enhancing both analytical depth and practical relevance. In this way, knowledge was not merely exchanged across disciplines but transformed, generating perspectives and pathways that could not have emerged within a single disciplinary boundary.

‘Coordination’ was another critical area of the INCREASE project. While the overall coordination rested with the lead team at the Disaster Research Unit (DRU) in Berlin, managerial tasks were distributed across lead institutions, sub-projects, and work packages. Effective coordination depended on the interplay among participants in their respective roles. For example, several work packages were led by different German partners, each using slightly different coordination approaches but following shared reporting and documentation procedures. Every semester, partners presented progress and outputs at project meetings, which were recorded and archived online for transparency and future reference.

Despite these efforts, coordination faced several challenges. Early in the project, confusion arose regarding the concepts of ‘focal point’ and ‘leadership,’ particularly among the Iranian partners. In many international collaborations, ‘focal points’ serve as national facilitators or intermediaries, but INCREASE deliberately avoided such roles to encourage a more decentralized structure. However, from the perspective of the German team, it appeared that cultural and institutional expectations led some Iranian colleagues to interpret this differently, generating tensions about leadership within their national team. Repeated clarifications and discussions did little to resolve the issue, so the consortium eventually shifted focus to direct collaboration at the work package level, emphasizing concrete goals and outputs with specific Iranian partners.

Another coordination challenge involved interpreting the project’s core documents: the Joint Project Description and the Sub-Project Descriptions. The joint document outlined the overall project’s objectives, methods, and shared activities, while each sub-project document specified the responsibilities and deliverables of individual partners. However, inconsistencies

occasionally emerged between the joint and partner-specific documents, or even among the sub-projects themselves. These discrepancies were addressed through meetings and negotiations among the involved parties, with outcomes recorded in official minutes to ensure alignment and transparency.

‘Sharing data and results’ was a central component of transdisciplinary collaboration in the INCREASE project and can be understood, in Latourian terms, as involving a heterogeneous network of human and non-human actors that collectively shaped cooperation. The question of how data could be effectively and securely shared was a recurring topic in monthly meetings. Balancing accessibility, security, and efficiency—while avoiding duplication across sub-projects—was a key challenge. To manage this, several tools were adopted to facilitate collaboration: Box.FU served as the primary platform for secure cloud storage and document exchange, while reference management systems such as Citavi, Mendeley, and Zotero supported the organization and sharing of literature. Occasionally, and upon specific requests, other platforms like Microsoft OneDrive were used for bilateral exchanges between German and Iranian partners, although these were not widely accepted. Additionally, Skyroom, a virtual meeting tool provided by Tehran University of Medical Sciences (TUMS), supported online meetings in specific work packages. Recognizing the importance of data protection on both sides, the Berlin-based lead team attended a data security training course and prepared detailed guidelines for all partners. These included recommendations on the safe use of digital communication channels and protocols for encryption, backups, password management, and cloud storage. From the German team’s perspective, these measures were essential to balance transparency with security and to comply with institutional and ethical standards for data handling. Data-sharing issues emerged as a recurring theme in monthly coordination meetings over the project period.

The strong interdependence among INCREASE sub-projects made structured coordination essential for sharing data and results, reinforcing the need to align human collaboration with shared technical infrastructures. Many work packages relied on the preliminary findings of others, demanding timely access to data and updates. Clear communication channels and structured timelines were therefore established to synchronize outputs, with Box.FU functioning as a centralized repository for interim and final results. Regular meetings and reporting sessions further allowed partners to discuss progress, align methodologies, and troubleshoot challenges collectively. Another key non-human actor in this assemblage was the MediaWiki-based resilience repository, developed to serve as a shared, evolving platform for documenting and assessing resilience and IDRM approaches across contexts. Grounded in the principles of the Sendai Framework for Disaster Risk Reduction, this Wiki aimed to facilitate knowledge exchange and cross-country learning. However, several partners encountered difficulties accessing or editing the platform, reflecting how uneven familiarity with digital tools affected participation. Despite this, the Berlin team maintained and updated the platform continuously, ensuring that all partners could contribute to building its content. Throughout the project, the combination of these digital tools and structured coordination mechanisms enhanced collaboration and knowledge integration across disciplines, countries, and scientific

and practical backgrounds. Notably, despite the long exchange of data and information, no incidents of security breach were reported during the project's duration.

The final essential area for transdisciplinary and international collaboration is the 'integration of results'—the process of consolidating collaborative knowledge into coherent outputs. In the INCREASE project, this was achieved through joint reports, conference presentations, policy briefs, peer-reviewed papers, and the Wiki-based repository. Integration required balancing external requirements, such as milestones set by the funding body, with internal needs for coherence among sub-projects. Aligning timelines, coordinating contributions, and maintaining continuous communication were crucial to ensure consistency and progress.

Experience played an important role in this process. Senior researchers often provided the leadership necessary to coordinate collaborative publications and presentations, while early-career researchers occasionally assumed leading roles, gaining valuable experience in project-wide integration. Beyond technical coordination, fostering an inclusive and dialogic environment was equally critical. Encouraging openness and respect across disciplines enabled participants to bridge conceptual and methodological divides, strengthening both the quality and legitimacy of the integrated results. This inclusive approach also extended outward: partners from different institutions and disciplines co-organized sessions and panels at international conferences, enhancing dissemination and reinforcing the project's transdisciplinary ethos. Ultimately, the integration of results proved not only a technical challenge but also a social and intellectual achievement—transforming diverse disciplinary contributions into a shared and contextually grounded understanding of disaster risk management.

5. DISCUSSION AND CONCLUSION: THE PROCEDURAL MODEL OF THE INCREASE PROJECT WORK

Drawing on the literature and the INCREASE project experience, we identified three key elements shaping a transdisciplinary procedural model for international cooperation in disaster research: (1) the growing societal relevance of disaster and risk; (2) changing social and environmental conditions; and (3) project development as an iterative process. These elements were iteratively discussed and refined within the research team and constitute the empirical and conceptual basis for the procedural model presented in Figure 3.

Disasters represent a permanent societal challenge, demanding continuous adaptation. Between 2021 and 2025, the COVID-19 pandemic and the 2021 German floods—though not initially considered—significantly influenced the INCREASE project. These events forced the consortium to shift in-person exchanges to digital collaboration, allocating new resources and reshaping workflows. Such experiences underscored the need for flexibility and continuous learning in transdisciplinary research. Moreover, given that both societal and biophysical systems are dynamic and loosely coupled, the project was deliberately designed to allow

iterative adjustments in prevention, protection, and assistance strategies. The funding and project structure also followed an iterative model. The proposal phase represented the first cycle, integrating preparatory work into a coherent application. The funded project, beginning in February 2021, marked both continuation and re-start—particularly in team building, as new members joined. Each sub-project pursued transdisciplinary goals within its own scope while contributing to the consortium’s collective outcomes. These parallel yet interlinked processes required constant coordination and synthesis.

This three-phase process structure, refined through years of transdisciplinary practice, provided an adaptable framework to each sub-project or work package. Its flexibility proved essential for maintaining coherence amid evolving conditions and diverse collaborations, while adaptations to planned work packages remained necessarily incremental and strategic due to the legal and contractual constraints of the funding framework.

While the conceptual phase provides a useful orientation for project work, the process model approaches (Jahn et al., 2012; Lam et al., 2021; Lang et al., 2012) need further reflection. These approaches often juxtapose ‘science’ and ‘practice’ too simplistically. Although the term ‘scientific practice’ (Lang et al., 2012) acknowledges science as a form of social practice, all other practices—economic, political, religious, and cultural—are treated as a homogeneous category of ‘social practice.’ This implicitly privileges science, despite repeated claims of equality between scientific and societal actors in transdisciplinary research. For the INCREASE project, this critique had direct implications. It required recognizing the heterogeneity of non-scientific practices and mitigating asymmetries in cooperation, particularly science’s dominance. Given the consortium’s scientific majority and disciplinary diversity—spanning natural, technical, and social sciences—ensuring balanced, inclusive collaboration was essential.

The procedural model developed for the INCREASE project, illustrated in Figure 3, adopts a dynamic and iterative approach to addressing the complexities of transdisciplinary and international research collaboration. It provides a structured pathway from ‘indeterminacy’ and exploration to construction and ‘determination’.

The model begins with (jointly) identifying a set of problems and questions across key areas, which we discussed above, such as contextual (rapidly changing) conditions, communication, interculturality, interdisciplinarity, coordination, data sharing, and integration of results. This initial exploration phase involves recognizing and framing uncertainties and challenges that must be addressed.

At the core of the model lies a cyclical process of testing, selecting, (re)opening, and closing, guided by reflective learning. This iterative cycle enables continuous re-evaluation and adaptation of approaches to address identified or newly emerging issues—such as those encountered with Iranian partners working under very different conditions. Reflective learning ensures that the project remains adaptive and responsive to new insights and to new events such as disasters and the like, fostering the integration of diverse perspectives and methodologies. Documentation plays a central role in this process, capturing the evolution of

ideas, strategies, and solutions. In INCREASE, this took the form of a living working repository compiled by the lead team, incorporating meeting minutes, workshop reports, webinar summaries, and other records.

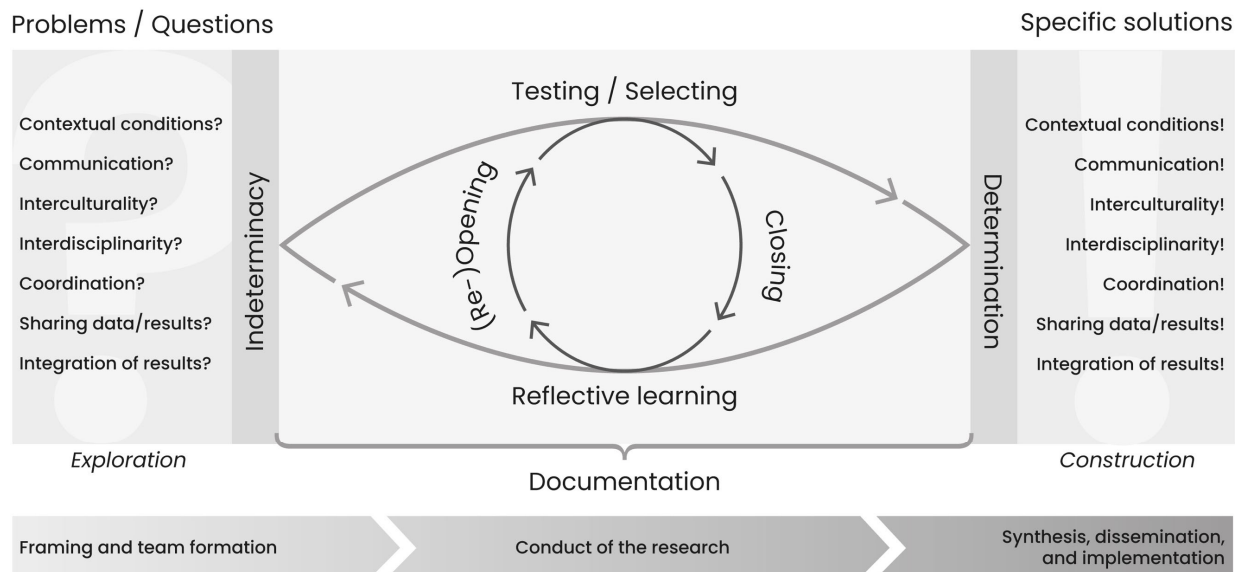


Figure 3. The procedural model of the INCREASE project work
Source: Authors, 2026, based on the ‘procedural eye’ of Lorenz (2010, 2022)

As the project advances from indeterminacy to determination, the model enters the construction phase, where solutions and research outputs are developed and implemented. This stage focuses on translating collaborative knowledge into tangible results, ensuring that the key areas—context, communication, interculturality, interdisciplinarity, coordination, data sharing, and integration—are effectively addressed. The structured integration of results guarantees that both external (funding-related) and internal (project-driven) requirements are met, thus supporting the overarching objectives of disaster resilience and risk management envisioned in the INCREASE project.

In this model, ‘indeterminacy’ and ‘determination’ are not treated as sequential project phases but as coexisting conditions that shape collaboration over time. Indeterminacy refers to moments in which problem definitions, roles, methods, and outcomes are not yet stabilized and remain open to negotiation among heterogeneous actors. In project management terms, this is not merely ‘initial uncertainty’ but a productive space in which innovation, learning, and reconfiguration can occur, allowing new associations between scientific, institutional, and societal elements to emerge. Determination, by contrast, denotes processes of stabilization through which actors, resources, rules, and expectations become provisionally fixed—via funding structures, administrative procedures, evaluation criteria, or institutional mandates—enabling coordination, accountability, and implementation. Rather than opposing states, indeterminacy and determination are dynamically intertwined: excessive determination can prematurely close innovation spaces, while sustained indeterminacy can undermine continuity and delivery. Overall, the model underscores the value of reflective learning and systematic

documentation for achieving coherent and effective integration of collaborative knowledge into actionable outcomes.

This paper has examined the complex dynamics of transdisciplinary and international collaboration in disaster research through the lens of the INCREASE project, highlighting the critical interplay of cultural, methodological, and contextual factors, including contextual changing conditions such as disasters that occurred during the project. Several of these findings are consistent with previous research on transdisciplinary disaster risk reduction and sustainability collaborations. For example, the importance of integrating diverse forms of knowledge, managing communication across disciplinary boundaries, and fostering mutual learning has been widely documented in transdisciplinary DRR research (Gall et al., 2015; Lang et al., 2012). The case of INCREASE largely supports these observations, demonstrating that such challenges remain central in international and intercultural research settings. One of the central findings is the importance of cultural dimensions in shaping collaboration. Differences in work habits, calendars, and communication practices between German and Iranian partners required ongoing attention, careful coordination, and dedicated intercultural training to foster mutual understanding and respect. Closely linked to this is the challenge of integrating local knowledge and practical expertise into the research process. Efforts to combine insights from diverse stakeholders, including disciplinary experts and practitioners, were crucial for producing relevant outputs. However, it is important to note that many current funding agencies do not systematically consider the inclusion of non-scientific partners—particularly local or community organizations—during the preparation phase of research projects, which can limit opportunities for early engagement and co-creation of knowledge. This integration required bridging differences in disciplinary methods, languages, and organizational practices, emphasizing the value of flexible, iterative approaches to project work.

A further dimension concerns language and translation. While English functioned as the project's working language, it also acted as a mediating layer between different epistemic and cultural contexts. Core concepts such as 'risk', 'disaster', or 'resilience' do not carry identical semantic fields across German, Iranian, and English academic and policy traditions. Their translation was therefore not a neutral transfer of meaning but an iterative process of negotiation, clarification, and partial approximation.

Another key insight concerns the role of contextual conditions, including funding asymmetries, political uncertainty, and global crises such as the COVID-19 pandemic, which influenced both project execution and decision-making. We also observed how rapidly changing conditions—such as the 2021 floods in Germany and political developments like the escalating situation in Iran—prompted shifts in how partners cooperated, at times stimulating collaboration and at others constraining it. Likewise, addressing funding disparities required deliberate efforts to maintain equity in dialogue, redistribute tasks pragmatically, and ensure that all partners could contribute meaningfully despite structural inequalities. Thus, the INCREASE project has highlighted that adaptability is essential for navigating these conditions, allowing the consortium to adjust communication channels, redistribute resources, modify workflows, and revise strategies while maintaining continuity and quality in outputs. At the same time, these findings extend existing literature by illustrating how geopolitical constraints,

international sanctions, and unequal funding arrangements shape collaborative processes in Global North–South partnerships. While previous studies have highlighted institutional and organizational barriers to collaboration (Gall et al., 2015), the INCREASE case shows how broader political and economic conditions can directly affect participation, coordination, and knowledge exchange over extended project periods. Overall, the findings underscore that effective transdisciplinary collaboration depends not only on structured project management and clear protocols, but also on continuous reflection, learning, and sensitivity to cultural, social, and environmental contexts.

Likewise, although the procedural model primarily foregrounds collaborative processes, these procedures had tangible implications for knowledge production and IDRM-relevant outcomes. The iterative and reflexive modes of collaboration influenced how risks were framed and interpreted, shifting the focus from isolated hazards toward multi-risk, systemic, and context-sensitive understandings: see, for example, the IDRM Scoping tool (Sandoval et al., 2025). The structured integration of scientific, technical, and practice-based knowledge informed the design of comparative analyses, synthesis reports, and policy-oriented outputs, thereby shaping how evidence was translated into IDRM-relevant insights. While the project timeframe did not allow for a systematic assessment of downstream implementation or resilience outcomes, the collaborative procedures contributed to enabling conditions for action, including shared problem definitions, improved mutual understanding between research and practice, and the co-production of outputs intended for policy and institutional uptake. In this sense, the model's contribution lies less in producing direct resilience outcomes than in shaping the epistemic and organizational foundations upon which IDRM measures can be developed and implemented. The findings also resonate with recent procedural and co-production approaches in disaster risk reduction, including the Risk-Tandem Framework (Parviainen et al., 2025), which emphasizes iterative knowledge integration among scientific, policy, and practice actors. Similar to Risk-Tandem, the procedural model presented here highlights reflexive learning, continuous adaptation, and the co-production of risk knowledge. However, our model places stronger emphasis on intercultural collaboration, changing contextual conditions, and the management of asymmetries in international research partnerships.

Despite these achievements, the study faced limitations. While the project included multiple moments for reflection, such as monthly and project meetings, there was limited opportunity to systematically evaluate the long-term impact of transdisciplinary collaboration, as the project concluded with the final outputs. Another limitation is that the empirical analysis predominantly reflects the perspective of the German coordination team, with the experiences and interpretations of Iranian partners and other non-academic stakeholders necessarily mediated through this lens rather than represented directly. As a result, the procedural model should be understood as a reflexive reconstruction developed primarily by Northern academic partners, informed by—but not co-produced in equal measure with—Global South and non-academic actors. Additionally, some methodological adaptations—especially regarding digital communication and integration of locally specific knowledge—were constrained by practical and political factors, which may have limited the full potential of intercultural and cross-disciplinary learning. Worth noting here is that, as a case study, the well-known limitations to

generalization apply; while funding conditions and geopolitical constraints are context-specific, the procedural logic of the model may be transferable to other North–South research settings.

Nonetheless, the project provides several lessons for future endeavors from the academia and beyond. First, early investment in intercultural training and explicit strategies to manage asymmetries among partners is critical for fostering trust and equitable participation. Second, iterative integration of local knowledge with scientific methods must be structured but remain flexible, allowing adaptation to emerging findings and contextual shifts. Third, robust documentation and reflective learning are invaluable for maintaining continuity, enabling knowledge transfer, and guiding adaptive decision-making. These insights not only inform future transdisciplinary and international cooperation projects in disaster risk management but also contribute to advancing research on transdisciplinary methodologies more broadly, providing evidence-based guidance on combining cultural awareness, local engagement, and contextual adaptability to achieve effective research outcomes.

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