Critical Housing Analysis
Volume 13 | Issue 1 | 2026 | 46-57
Available online at www.housing-critical.com
https://doi.org/10.13060/23362839.2026.13.1.606

A Transdisciplinary Approach to Housing: Applying Three Types of Knowledge

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Abstract: *Transdisciplinarity has become an increasingly prominent concept in addressing today's complex societal challenges and is often invoked as a buzzword in grant proposals. But how can a transdisciplinary approach to housing be implemented? This contribution presents a systematisation of our experiences in an EU-funded project, which could serve as a starting point for similar processes. Key to the use of such an approach is creating an understanding of societal challenges by bringing together insights from different disciplines and fields of knowledge in academia and practice. Our main conclusion was that preconditions are just as important as the design of the transdisciplinary process, and these preconditions include gaining an understanding of the needs and specificities of the stakeholders. Furthermore, a "three types of knowledge model" for organising knowledge exchange processes, adopted from the Swiss school of transdisciplinarity, enabled the redefinition of challenges and the identification of new perspectives and strategies for change in practice.*

Keywords: housing; transdisciplinarity; system knowledge; target knowledge; transformation knowledge.

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Introduction

The challenge of addressing the shortage of affordable and sustainable housing, particularly in urban markets, concerns multiple academic disciplines, including planning, sociology, architecture, and economics. Moreover, it touches on various policy areas, including welfare, urban planning, environmental policy, and economic development. To bring together these diverse perspectives, transdisciplinary approaches (TdAs) have increasingly been proposed as a way of enabling collaboration between academics and stakeholders from society and the professional housing field who can provide answers to complex societal challenges. Transdisciplinarity is described here as an approach that transcends disciplinary boundaries, integrating academic knowledge from different disciplines with non-academic knowledge from stakeholders, practitioners, and local communities to address complex real-world problems. Its potential to be more than a buzzword and to become effective and operational depends on academics' concern on how concerned academics are with the transformative potential of their work in professional practice and its adoption by society (Lawrence et al. 2022). However, as of yet, there are few studies on how to implement such an approach, particularly in the field of housing (Lehner et al. 2025). The aim of this contribution is to explain how a process-based approach to transdisciplinarity (Lawrence et al. 2022) can address complex housing problems, and to highlight some of the obstacles encountered in such a process. These obstacles are mainly related to epistemological differences, such as those that exist between architecture and the social sciences.

The process of developing a TdA that can be replicated in other contexts started with a literature review of frameworks for affordable and sustainable housing, which is described in the next section. The following three sections contain a literature review of TdAs and a review of 'experiments' in a European project on how to develop and implement a TdA. The objective of the project, which involved researchers, PhD students, and partner organisations from the field of housing, was to develop an approach that would serve as a guide to or support decision-making relating to the provision of sustainable and affordable housing. The empirical trajectory that we undertook, which consisted of interactive sessions, a survey, and interviews, can be characterised as a trial-and-error approach, evaluating each – not necessarily linear – step in building an approach for creating a collective learning environment that would stimulate the transdisciplinary exchange of knowledge. Below we critically reflect on these steps in developing a 'prototype' for implementing a TdA, before moving on to the Conclusion.

Affordable and sustainable housing: multistakeholder frameworks

The first phase of developing a TdA involved conducting a literature review to explore the frameworks that address both housing affordability and housing sustainability, the two key concepts in our project. Another criterion for selecting frameworks was that they could be interpreted as 'multistakeholder' frameworks from the perspective of our definition of a transdisciplinary approach: that they include a number of different stakeholders (assumed diverse disciplines) and combine academic knowledge and practical knowledge from policymakers, professionals, and consumers, among others. A framework was then included in our review if it was developed based on a (systematic) review of academic literature followed by a phase of stakeholder engagement relevant to the framework's objectives.
This approach delivered nine frameworks (see Table 1). These frameworks and their different

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'checklists' of criteria are underpinned or framed by different core values of housing provision, such as housing as a human right, sustainability, affordability, quality of life, and participation in design processes. As such, the frameworks explore different aspects of their 'translation' into practice. They are also steered by their different scopes, which are formulated in terms of aims, such as 'assessing' decision-making, design processes, the relevance of research approaches, and housing outcomes for end users. Therefore, they focus on different (combinations of) target groups, such as housing providers, designers, policy-makers, and other professional stakeholders. In some cases or stages they also focus on residents and academics – for example, during development and testing of the framework.

Table 1: A review of different multistakeholder frameworks for housing affordability and sustainability

Publications	Values	Aims
Golubchikov and Badyina (2012)	Housing as a human right	To make policy in developing countries
Ibem and Azuh (2011)	Quality of life	To assess the framework and public housing programmes
Turcotte and Geiser (2010)	Sustainability	To develop new housing (US)
Adamec et al. (2021)	Sustainability	To assess available indicators and sustainability
Piparsania and Kalita (2022)	Cultural sustainability	To assess cultural sustainability / new housing (India)
Dissart and Ricaurte (2023)	Quality of life	To assess the quality of life based on the capability approach (UK)
Pullen et al. (2010)	Affordability and environmental sustainability	To assess the performance of new, urban affordable housing (Australia)
Mulliner et al. (2013, 2015, 2016)	Sustainable affordability	To facilitate multicriteria decision-making for local policy-makers (UK)
Lespagnard et al. (2023)	Equitable housing, participation of multiple stakeholders	To communicate between stakeholders in project design (Belgium)

Source: Elsinga et al. (2024).

To summarise, the review revealed that multistakeholder frameworks for affordable and sustainable housing are largely tailored to their specific purposes. In fact, they reflect the tensions that exist among the defined 'assessment' criteria. From this review we were able to conclude that the frameworks function as facilitators of a common understanding of the criteria for 'assessing' affordability and sustainability and of the trade-offs between the criteria. As such, the frameworks enable knowledge exchange among relevant actors, disciplines, and

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contexts regarding complex housing-related challenges in society.

A transdisciplinary approach supporting knowledge exchange beyond disciplines

This finding that none of the frameworks in the previous section offers 'holistic' guidance on the provision of affordable and sustainable housing steered the literature review in another direction. The desired TdA was therefore reconceived as one that supported knowledge exchange across academic disciplines and with practice.

The term 'transdisciplinarity', which emerged in the 1970s, was introduced by experts from various disciplines with the aim of understanding reality and contributing to the academic debate beyond individual disciplines (Elsinga et al. 2024). Two streams of transdisciplinarity were born. According to Piaget, transdisciplinarity is regarded as a 'higher stage succeeding interdisciplinary relationships' (Bernstein 2015: 6). Those inspired by this 'philosophical stream' emphasise rethinking knowledge itself and concentrate on educating academics and practitioners in universities on the principles of a 'transdisciplinary mindset' (Biberhofer & Rammel 2017).

The 'practice stream' focuses on addressing 'wicked' societal challenges by combining knowledge from different academic disciplines and practice. The Zurich International Transdisciplinarity Conference (2000) established a shared definition of this 'practice stream' (McGregor 2015: 10):

> *Transdisciplinarity is a new form of learning and problem-solving involving cooperation among different parts of society. Transdisciplinarity research starts from tangible, real-world problems. Solutions are devised in collaboration with multiple stakeholders. A practice-oriented approach, transdisciplinarity, is not confined to a close circle of scientific experts, professional journals, and academic departments where knowledge is produced. Ideally, everyone who has something to say about a particular problem and is willing to participate can play a role. Through mutual learning, the knowledge of multiple participants is enhanced, including local knowledge, scientific knowledge, and the knowledge of industries, businesses, and NGO's. The sum of this knowledge will be greater than the knowledge of any single partner. In the process, the bias of each perspective will also be minimized. (Häberli et al. 2001: 18-19)*

This practice stream, characterised as an applied and problem-driven societal approach, is the point of departure for our contribution. Drawing on this proven framework of the 'Swiss school' for linking different disciplines and the worlds of practice and academia, the team was inspired by the 'three types of knowledge' model proposed by Pohl and Hirsch Hadorn (2007): **target knowledge** is concerned with the values and goals being pursued; **system knowledge** focuses on understanding the problem and the system; and **transformation knowledge** addresses how change can be achieved. These three types of knowledge were operationalised in relation to the challenges of affordable and sustainable housing:

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- *Target knowledge:* understanding the desired future and the values and norms that guide decisions and actions. Target knowledge provides an answer to the question *'What should be?'* In the context of affordable and sustainable housing provision, generating target knowledge might involve translating the United Nations' Sustainable Development Goals (SDGs) – such as sustainable cities and communities (Goal 11), affordable and clean energy (Goal 7), and the reduction of social inequality (Goal 10) – to a local housing context.

- *System knowledge:* understanding knowledge (facts) about the current system in relation to the societal challenge in question. This knowledge focuses on the question *'What is?'* and is primarily analytical and descriptive. For example, in the context of housing scarcity, system knowledge involves developing a comprehensive understanding of the relevant socio-economic system, including particular aspects of housing availability, affordability, and sustainability.

- *Transformation knowledge:* understanding the process of moving (agency) from the current situation to the desired one. It addresses the question *'How to?'* and enables the formulation of concrete strategies and actionable steps. In the context of affordable and sustainable housing, generating transformation knowledge might involve, for example, implementing a pilot project to apply a new strategy for retrofitting social housing, introducing policies to promote more efficient use of existing housing, or forming partnerships to redevelop neighbourhoods.

These three types of knowledge structure and facilitate dialogue between the different participants in a TdA, particularly in terms of the languages spoken across various disciplines, in both practice and academia. This process-oriented and content-driven approach is meant to build bridges, increase reflexivity, and enable the connection of different viewpoints on tackling the given societal issue.

Experimenting with transdisciplinary knowledge exchange

Based on the three types of knowledge identified in the previous section, the process of tackling societal challenges was 'translated' into a 'game' of transdisciplinary knowledge exchange (Paio et al. 2024). This 'game' was played several times during the project in sessions with both academics from different disciplines and practitioners from the political and professional worlds illustrating the possible application of the theoretical model to an exploratory group discussion.

In the example presented here – a game session at the final project conference[1] – the discussion among academics and organisations from practice was not rigidly structured. The real-life 'lobby' challenge (target knowledge) was: 'Promoting policies and initiatives that improve access to affordable housing, ensuring that everyone has a place to call home without facing financial hardship'.

[1] https://www.re-dwell.eu/activities/conferences/barcelona

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Game sessions to make transdisciplinarity work

The RE-DWELL project involved a search to find a transdisciplinary way of working: to work with practice and across academic disciplines to find solutions. The project included many game sessions, of which the example presented in the main text was one example. This game session included three types of cards: representing challenges (target knowledge); actors, methods, and tools (system knowledge); and policies, projects, and partnerships (transformation knowledge). The structure of the session followed a clear progression and was organised into the following stages:

- *Team formation: Participants were divided into teams, ensuring a mix of expertise and perspectives. in this case: a partner from the policy sphere presented the central problem and led the session, which included some early stage researchers and supervisors with backgrounds in different disciplines (architecture, urbanism, public policy, social policy).*
- *Strategy development: The teams brainstormed and developed strategies to address the identified problems, integrating insights from their disciplines and the practical experiences of non-academic partners.*
- *Final presentation: Each team presented their refined solutions, highlighting anticipated benefits and implementation strategies, ensuring a comprehensive approach to the issues.*

For more information see Paio et al. (2024).

In exploring the challenge of affordable housing access, 'inadequate housing production' was quickly identified as a core issue. Initial discussions focused on land and financial systems, exploring different types of financial support for housing production and how national and local governments should develop plans and budgets. A shared observation was that financing is always a problem, which made the group wonder: Are there other ways of approaching and defining the problem at stake? This was not a straightforward process, but an iterative group process that resulted in the challenge being redefined from a shortage of dwellings to a shortage of living space for people. After all, housing production and the budget required for it were only a means, not an end. The conversation then shifted to the needs of people living in poor housing conditions. This people-centred approach broadened the discussion and highlighted that building new housing is not the only way to provide adequate shelter for those in need.

While following the rules of the game, *target knowledge* became more abstract: it was no longer just about 'housing production' but about the broader concept of 'living space'. This more abstract definition of the challenge created a need for different types of *system knowledge* – about more than just housing production and the policies and instruments that support it. The focus shifted to available living space, which also includes vacant and underoccupied homes, buildings, and land.

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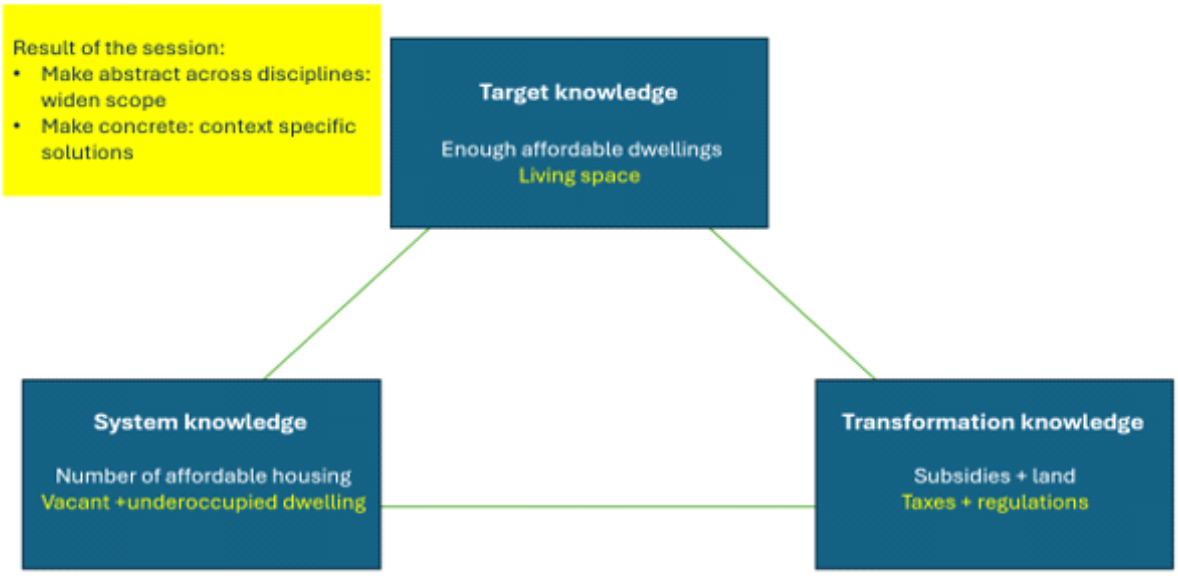
Figure 1: Redefinition of the problem using a transdisciplinary game



The original definitions are in white; the reframed issues and solution space are in yellow.
Source: Paio et al., 2024.

This discussion raised a 'how is it possible question' (*system knowledge*): 'How is it possible that there is both a severe housing shortage and at the same time a large amount of unused living space that could provide people with a home?' By identifying key actors, mechanisms, and policies, the team came up with potential explanations for this paradoxical system's outcomes. Explanations for this paradox include tax systems, rent regulations, and the motivations of property owners to leave housing unoccupied. The next step was a brainstorming session on how to use the existing housing stock when underoccupied or vacant (*transformation knowledge*) (Figure 1).

The next phase of the discussion focused on how to bring about change in the desired direction. The key question was: What is needed to make available space suitable for providing decent housing? Drawing from different disciplines, the team identified new solutions and strategies (*transformation knowledge*), such as taxing unoccupied or vacant houses and regulating the use of housing spaces.

This example illustrates the importance of developing a deep understanding of the challenge at hand. This requires bringing together diverse areas of expertise in a structured manner and fostering a shared understanding at a more abstract level – in terms of both policy and the physical environment. In this case, the approach led to a redefinition of the challenge, which in turn paved the way for new strategies, guided by the steps outlined in the toolbox. A crucial aspect of this process was the interplay between *abstract knowledge* – the creation of a simplified challenge beyond academic disciplines by reducing complexity and focusing on essential characteristics – and *specific knowledge* – the application of abstract insights to concrete strategies. Abstraction served as a way to translate disciplinary knowledge into a shared conceptual space (Klein 1996; Henriksen et al. 2014). To this end, the contributions of the practitioners and stakeholders directly involved were essential for identifying and

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emphasising the relevant transformative knowledge as an outcome of the process.

Reflections on a transdisciplinary approach

Societal partners

An essential ingredient for developing a TdA is understanding the perspectives, interests, and standpoints of all participants. As revealed by interviews with project partners from policy and practice, several outcomes of the research conducted with academia stand out for their transformative potential. Most often, research is expected to provide tools and methods to guide the management of urgent issues that practitioners are confronted with. However, feedback from the project partners showed that another desired outcome is the development of reflexivity on one's own practice – 'reflexivity-on-action' (Schön 1984). This can mean developing an axiological perspective on practice or reevaluating past experiences and their underlying motivations and values. This reflexivity can lead to a change in perspective or a change in the way things are done. To better align practices with one's objectives and values, new decision-making procedures can be developed, such as those that acknowledge 'pluralistic expertise' (Nowotny 2003: 151) and knowledge based on use and lived experience. Academic inputs could therefore inform new procedures of housing production or transformation, such as collaborative planning and post-occupancy evaluation, or even the development of new forms of ownership, tenure, or housing governance. Working together with academics in transdisciplinary research is therefore seen by researchers in housing organisations as an opportunity to take a more structured theory-based approach, even in their in-house research work (Lees & Warwick 2022).

In addition to the positives, partners from practice also emphasised several hurdles for transdisciplinary research. Firstly, the academic world and the world of practice have different time horizons. Practitioners have to address urgent problems and find robust solutions that can be applied in the short term. This urgency runs counter to the time required by robust academic research. It may also bypass the interest in the soundness of the proposed methodological and theoretical framework, which may seem out of proportion to practitioners who are accustomed to combining methods and theories more freely in order to quickly achieve results (Ibid.). Time constraints are even greater in TdA, as mutual understanding requires both time and awareness of the differences in communication and wording used in the project.

Academics: exchange across disciplines

One final critical issue of a TdA was found to be the difference in positioning that arises from disciplinary differences in the project team and the need to adapt. The epistemological differences that most often need to be bridged when dealing with housing are the ones that exist between architecture and the social sciences, as in the presented project. In order to move beyond the understanding that architects are creating the future and social scientists are explaining the present and the past, architecture must embrace critical social inquiry, while the social sciences must recognise space as an active force in shaping society (Dovey 2010). The integration of these two disciplines is essential for addressing real urban problems and the

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politics of place.

Collaboration between architecture, planning, economics, sociology, and political science was experienced both as necessary to tackle societal challenges and as difficult. The exchange of information enabled participants to explore one another's disciplinary backgrounds and to realise that each field approached the shared problem space from distinct premises and conceptual frameworks. Engaging with the methods, tools, and actors further deepened this understanding, fostering what can be termed 'system knowledge' – an appreciation of the broader contextual and relational dimensions of the problem (Jakobsen & Bucciarelli 2007: 299). To develop such a perspective, team members were required to move beyond the familiar boundaries of their own disciplines and engage in a process of epistemological and methodological integration. Reflexiveness and an openness to new ideas were found to be essential for overcoming such differences in terminology and creating a shared understanding across academic disciplines (Pearce et al. 2018). This is also illustrated by a quote from one of the project participants:

> *Transdisciplinarity is about 'Being Humble', putting our biases and egos aside, and focusing on the problem at hand. It is about recognising that everyone is on a continuous learning journey and that no one knows everything. Throughout my ... journey, discussions, secondments, and research interviews, I learned that what I might think is a solution and being excited about it, could be problematic for someone else. 'Being Humble' entails listening, questioning others and ourselves, reflecting, and sharing. It is also about being open to change and expressing what we need for that change, both for others and for ourselves. (Elghandour 2023)*

Bridging this divide, therefore, represents not only a methodological challenge but also a major opportunity to produce a more inclusive, resilient, and socially attuned learning environment.

Conclusions

As this contribution's reflection demonstrates, developing a transdisciplinary environment is an iterative and, at times, confusing process. Bridging the borders between academic disciplines and with practice is necessary in order to facilitate transdisciplinary knowledge exchange. Starting from practice (non-academic knowledge from practitioners and policy-makers), transdisciplinarity is an approach that transcends disciplinary boundaries and combines academic knowledge from different disciplines to address complex real-world problems. The "three types of knowledge model" appeared fruitful for facilitating the dialogue among participants. Experimenting with this model for the topic of affordable and sustainable housing provision showed that a redefinition of challenges and the identification of new perspectives and strategies for change can arise from an iterative process of abstracting targets and addressing the context-specific nature of problems and solutions. Finally, we discovered that preconditions were just as important as the process design. These preconditions included attitudes of humility, openness, and reflexivity, as well as an understanding of the needs and specificities of all stakeholders.

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Acknowledgement

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie Grant Agreement No. 956082.

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