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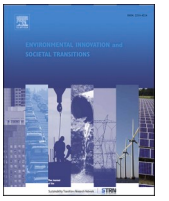

Research article

Modes of intermediation: How intermediaries engage in advancing local bottom-up experimentation

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ABSTRACT

Intermediaries are recognized as influential actors in advancing local bottom-up experimentation and strengthening its impact on urban sustainability transitions. Recent studies have articulated intermediation by listing diverse roles and activities that intermediaries perform and by presenting theory-based typologies of different intermediaries. However, such listings and typologies fail to capture *how* intermediaries engage, often informally and multi-directionally, in local experimentation. To improve the conceptual clarity of intermediation in this context, we propose a framework of four intermediation modes: *brokering, configuring, structural negotiating,* and *facilitating and capacitating*. We employ these modes in two qualitative, ethnography and interview-based studies of intermediation in urban redevelopment and energy transition contexts. The studies demonstrate that intermediation requires simultaneous engagement in multiple modes owing to the intermediaries' different competencies, remits, and resources. Therefore, the modes are highly relevant for understanding what it takes to effectively intermediate and for preparing support mechanisms for intermediation in different experimentation domains.

1. Introduction

The built environment has an undeniable impact on today's urgent sustainability challenges, such as climate change and resource depletion. At the same time, cities and households alike show potential as important loci of novel solutions for sustainability (e.g., Bulkeley et al., 2011). In the field of urban sustainability transitions, scholars have drawn attention to local experiments, understood as initiatives and interventions that showcase attempts to innovate, learn, and develop new solutions (Bulkeley and Castán Broto, 2013; Seyfang and Smith, 2007), which are often co-developed and initiated from the bottom up by local actors and communities (Frantzeskaki et al., 2016; Mens et al., 2021). Scholars have highlighted the potential of local bottom-up experiments in pioneering and modeling new practices that may eventually have a more systemic impact on sustainability (Frantzeskaki et al., 2016). Yet, given the urgency and scale of the transitions needed, improved ways of governing, empowering, and scaling up such initiatives are necessary. Here, scholars have recognized the pivotal role of intermediaries in supporting the development of local experiments and renegotiating the conditions that present barriers to sustainable alternatives (Hargreaves et al., 2013; Hodson et al., 2013).

In innovation and transition processes, intermediaries have been recognized as relevant actors that connect different actors and types of knowledge and resources, enhancing opportunities for the development of new alternatives (e.g., Howells, 2006; Kivimaa et al., 2019a). Research on intermediaries has progressed through several waves in different disciplines and domains, starting in the

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1990s with cultural and innovation intermediaries (Hennion, 1989; Howells, 2006) and moving on to urban intermediaries (Hodson et al., 2013), market intermediaries (Callon et al., 2002; Pollock and Williams, 2016), and transition intermediaries (Kivimaa et al., 2019a; Mignon and Kanda, 2018). Because of these research field shifts, there has been an uneven conceptual development regarding different areas and types of intermediaries. Overall, industry-related intermediation, including the typical innovation-system policy and regulatory actors, has attracted more scholarly attention, while the intermediation related to local, bottom-up, and peer-to-peer activities has seen less research and conceptual development (Barnes, 2016; Hargreaves et al., 2013; Stewart and Hyysalo, 2008) despite being recognized as equally important (e.g., Kivimaa et al., 2019a).

In this paper, we seek to advance the conceptual development of intermediation, particularly related to local experimentation emerging from the bottom up. Such settings accentuate some conceptual shortcomings that are present across intermediary research. To date, conceptual efforts have concentrated on articulating lists of the diverse roles and activities that intermediaries perform (Bessant and Rush, 1995; Howells, 2006) and providing broad, theory-based typologies of the different types of intermediaries in transitions (e.g., Kanda et al., 2020; Kivimaa et al., 2019a). However, such listings or typologies fail to capture *how* intermediation work (Moss, 2009) is performed or the related patterns and irregularities of intermediary engagement, particularly given the informal, contingent, and multi-directional nature of intermediation that advances local bottom-up experimentation.

The following example from an urban redevelopment context illustrates the research problem. If a municipality commissions an intermediary to bridge a "structural hole" (Burt, 1992; Granovetter, 1973) between the owners of vacant office buildings and their potential temporary users with a set of predefined measures, it may not solve the issue. For an intermediary to do such bridging work, which we below characterize as an intermediation mode of *brokering* (cf. Kanda et al., 2018; Spiro et al., 2013), they need to engage in other intermediation work. For the brokering to be effective, the intermediary needs to engage in what we later conceptualize as *facilitating and capacitating* (cf. Bakardjieva, 2006; Smith et al., 2016) by aiding the potential users to elaborate both their spatial needs and economic requisites to owners. The intermediary may also need the skills required for *configuring* (cf. Barnes, 2016; Stewart and Hyysalo, 2008), such as redesigning floor plans for multiple occupants or suggesting deviations from typical rental contract terms. Moreover, it is likely that the intermediary needs to engage in what we conceptualize as *structural negotiating* (cf. Hernberg, 2022; Hodson and Marvin, 2009; Matschoss and Heiskanen, 2018), renegotiating applications of the building code and the profit calculation instruments of incumbent property owners. Hence, the adequacy of intermediation is not limited to the positioning, remit, background, or affiliation of the intermediary nor to its predefined suite of actions. We suggest that the different and often necessary facets of intermediary engagement exemplified above can be understood as *modes of intermediation*, a concept that we elaborate in Section 3.

Thus, to add conceptual clarity to intermediation in local bottom-up experimentation, we ask the following research questions: (1) How to adequately conceptualize modes of intermediation in local bottom-up experimentation? (2) In what ways do intermediaries perform such modes in different settings?

In addressing these questions, we elaborate a framework of four modes of intermediation and further elucidate the modes and related activities in practice based on empirical studies in two different contexts of local experimentation. The paper is structured as follows: Section 2 reviews the main areas of intermediation literature and articulates both our focus and the research gap concerning intermediation in local bottom-up experimentation. Section 3 introduces our updated framework of four intermediation modes. After discussing methods and data in Section 4, Section 5 elucidates the four intermediation modes in urban redevelopment and energy transition contexts and discusses their similarities and differences. Finally, in Section 6, we elaborate the further implications of the conceptual and empirical work of this paper.

2. Intermediaries and intermediation in urban sustainability transitions

Diverse types of actors can be considered intermediaries. Examples include public organizations, innovation agencies, independent consultants, civic networks, and communities of citizens or consumers (Hyysalo et al., 2018; Kivimaa et al., 2019a). Besides such actors, intermediation is also often performed by non-human entities, such as platforms and forums (e.g., Moss, 2009; Hyysalo et al., 2018). While intermediaries may be deliberately set up to intermediate (Marvin and Medd, 2004), other actors can also end up intermediating alongside their other work (Hyysalo et al., 2022; Kivimaa et al., 2020; Kanda et al., 2022). Thus, a defining feature of the different intermediaries is not their organizational form but the "relational work" they perform (Moss, 2009: 1490) and their in-betweenness: Intermediaries work across the boundaries between other actors and their interests, resources, technologies, forms of knowledge, arenas, and scales of action (Howells, 2006; Moss, 2009; Moss et al., 2011).

In this section, we first review the main areas of intermediation literature that are relevant to local bottom-up experimentation, in the multidisciplinary domains of innovation and urban sustainability transitions. We then specify our focus on intermediaries that are positioned to advance local bottom-up experimentation in the built environment. We end this section by elaborating the research gap related to understanding these intermediaries, which we seek to remedy in Section 3.

2.1. Intermediaries in innovation

Since the 1990s, interest in the role of intermediaries in innovation processes has emerged in research fields including those of innovation, management, technology transfer, and diffusion (Howells, 2006). Intermediation literature also draws on research on boundary work and boundary spanning in management studies (Aldrich and Herker, 1977; Fennell and Alexander, 1987). Examples of intermediaries that have been identified to play a role or function in enabling innovation include media companies, telecom platform operators, distributors, and knowledge-intensive business services such as advertising agencies, market research agencies, and management consultancies (Bessant and Rush, 1995; Howells, 2006; Stewart and Hyysalo, 2008). Recently, scholars have drawn

particular attention to intermediaries supporting companies in eco-innovation (Kanda et al., 2018, 2022).

Innovation intermediaries are found to mediate between different actors in innovation networks, such as innovators and policy actors or the developers and users of new technology (Howells, 2006; Stewart and Hyysalo, 2008). Intermediaries engage in innovation processes in different ways: They cross boundaries and build connections between demand and supply (Bessant and Rush, 1995; Edler and Yeow, 2016; Klerkx and Leeuwis, 2009), they act as knowledge brokers who aggregate and disseminate knowledge (Hargadon and Sutton, 1997; Howells, 2006), and they engage in technology and resource transfer (Howells, 2006). While the mainstream research on innovation intermediaries has focused on industry- and regulation-related intermediaries, such as knowledge-intensive business services, scholars have also highlighted the important intermediary activities of users, consumers, and customer organizations. Here, intermediaries help users to learn, configure, troubleshoot, and locally innovate new technologies (Bakardjieva, 2006; Boon et al., 2011; Stewart and Hyysalo, 2008). They also help adopters with challenges related to the diffusion of new technologies (Bergek, 2020; Mignon, 2017; Mignon and Bergek, 2016).

2.2. Intermediaries in urban sustainability transitions

Intermediaries have also been recognized in the field of urban sustainability transitions, which addresses the roles of cities (Frantzeskaki et al., 2017; Guy et al., 2011; Hodson and Marvin, 2009), as well as spatial dimensions (Coenen et al., 2012), in long-term systemic transitions toward sustainability (see Geels, 2005; Köhler et al., 2019; Rip and Kemp, 1998). In the past 15 years, urban intermediaries (Hodson et al., 2013) have been studied in contexts such as those of low-carbon transitions in energy and infrastructures (Guy et al., 2011; Hodson and Marvin, 2009, 2012), housing (Kivimaa and Martiskainen, 2018a, 2018b), construction (Vihemäki et al., 2020), spatial planning and development (e.g. Hernberg, 2022; Stapper et al., 2020), and different forms of local experimentation (see Section 2.4). While much of this literature discusses "urban" transitions and intermediaries, the related issues also apply to built environments in rural areas in which the contribution of intermediaries has also been recognized, for example, contributions have been found in the contexts of agriculture, rural communities, and tourism (Kilelu et al., 2011; Pratiwi, 2020; Smith, 2022).

Cities and built environments are recognized as key sites for developing novel solutions and practices that advance sustainability, often initiated from the bottom up by local actors such as resident groups, civil society actors, or small businesses (Bulkeley et al., 2011; Frantzeskaki et al., 2017). However, built environments involve strong structural barriers to developing alternatives. These include strong technological, institutional, economic, and cultural path dependencies related to urban "regimes" (Fuenfschilling and Truffer, 2014; Geels, 2005), such as complex forms of governance, obdurate and solid infrastructures, highly regulated spatial and technological environments, conventional market actors, and sunk investments (Bulkeley et al., 2011; Dickey et al., 2022; Hodson et al., 2013). Moreover, urban sustainability transitions involve complex sets of actors and interests positioned across different scales (Hernberg, 2022; Hodson and Marvin, 2009; Hyysalo et al., 2022). Therefore, urban contexts particularly highlight the complex transition dynamics recognized in sustainability transitions research (see Patterson et al., 2017). Achieving transitions requires negotiations between niche and regime levels in order to challenge existing values, conventions, knowledges, and socio-economic positions (Castán Broto, 2017; Kivimaa et al., 2019a).

Urban intermediation, particularly that related to local experimentation, is often located at a nexus of several sociotechnical systems and infrastructures (Rohracher and Köhler, 2019). Consequently, there is a need for multifarious structural negotiating done by intermediaries (Hernberg, 2022). Urban intermediaries are also found to advance urban transitions by improving and mobilizing latent governance capacity in municipalities (Hodson et al., 2013). For example, they mediate the multiple interests and motivations involved in urban transitions and bridge the gap between broad-scale strategies and their local implementation (Hodson and Marvin, 2009; Hodson et al., 2013). Moreover, they can bridge knowledge gaps and catalyze communication and learning in complex governance contexts (Dickey et al., 2022; Hodson and Marvin, 2009). Furthermore, urban intermediaries have been found to be important in sustaining and consolidating grassroots innovations (Hargreaves et al., 2013; White and Stirling, 2013) and in advancing local experimentation (see Section 2.4 for more detail). In so doing, urban intermediaries largely respond to the failures of traditional or existing agents and networks to cope with the complex dynamics of urban sustainability transitions. Urban intermediation may require engagement across different system levels (see Kanda et al., 2020), ranging from interactions among local communities to mediating between them, local governments, and incumbent actors (Hernberg, 2022).

Urban intermediation has been performed by both dedicated intermediaries and actors primarily engaged in other activities. Examples include governmental or semi-governmental organizations (Hodson et al., 2013), municipalities (Gustafsson and Mignon, 2019), municipal innovation agencies (Matschoss and Heiskanen, 2018), planning consultants (Stapper et al., 2020), architects (Fischer and Guy, 2009; Hernberg, 2022), experimental user communities (Alatalo and Jokinen, 2017), community-based non-profit organizations (Leroux, 2007), and citizen exchanges on energy-related Internet forums (Hyysalo et al., 2018, Hyysalo et al., 2022).

2.3. Intermediaries in local bottom-up experimentation

There is growing recognition of the role of local contexts and initiatives in urban sustainability transitions (Castán Broto and Bulkeley, 2013; Ehnert et al., 2018; Köhler et al., 2021). Our interest here is in *local bottom-up experimentation,* by which we denote diverse small-scale sustainability initiatives and interventions that showcase attempts to innovate, learn, and generate novel solutions in order to mobilize transitions (Bulkeley and Castán Broto, 2013; Seyfang and Smith, 2007). These can be initiated by different local actors and communities, such as residents, civil society organizations, social entrepreneurs, small businesses (Mens et al., 2021), and informal local or loosely coordinated groups (Grandin and Sareen, 2020; Hyysalo et al., 2018; Hyysalo, 2021). The potential of such

experimentation for urban sustainability transitions has been discussed across a wide range of literature, including strategic niche management (Seyfang and Smith, 2007; Smith and Raven, 2012), the geography of transitions (e.g. Sengers and Raven, 2015), and urban development (Mens et al., 2021; Grandin and Sareen, 2020).

Local experimental initiatives—such as urban farming (White and Stirling, 2013), energy communities (Hargreaves et al., 2013), open smart-city citizen initiatives (Verhaegh et al., 2016), and urban development experiments (Hernberg, 2022; Lehtovuori and Ruoppila, 2012)—are often characterized by self-organization and their voluntary, impermanent, and iterative nature (Boonstra and Boelens, 2011; Castán Broto and Bulkeley, 2013; Grandin and Sareen, 2020). Nevertheless, such initiatives are found to catalyze change and pioneer new forms of social, economic, and cultural practices, patterns, and solutions, presenting the potential for a more systemic contribution towards sustainability (Frantzeskaki et al., 2016; Grandin and Sareen, 2020). Such bottom-up endeavors engage actors who are not traditionally involved in urban development, and they may also seek new forms of collaboration with incumbent actors and governments (Hernberg, 2022; Mens et al., 2021). For example, in spatial planning bottom-up initiatives are recognized to play an increasingly substantial role within established development practices (Mens et al., 2021; Boonstra and Boelens, 2011).

Local bottom-up experiments and communities often face struggles and barriers when trying to sustain themselves and develop or grow within prevailing structural conditions. To start with, they often have internal constraints related to management, resources, skills, and continuity (Seyfang and Smith, 2007; Grandin and Sareen, 2020; Ehnert et al., 2018). Moreover, local experiments typically struggle within existing market conditions and the legal, regulatory, and institutional elements of their operating contexts (White and Stirling, 2013; Hyysalo et al., 2022), which may also hinder their potentially wider impact (Seyfang and Smith, 2007). For example, bottom-up urban development practices do not easily conform with formal planning and regulatory frameworks or the conventions of real-estate business (Hernberg, 2021). Consequently, local experiments often face the dilemma of either "fitting and conforming" to the existing structural conditions or potentially challenging governments and incumbents to stretch or transform (Smith and Raven, 2012). Furthermore, mistrust and power asymmetries between local initiatives and government actors may hinder the linking of local solutions to formal policy contexts (Frantzeskaki and Rok, 2018; Isaksson and Hagbert, 2020).

Given such challenges, intermediaries are found to support and advance local bottom-up experimentation and innovative solutions in various ways. Intermediaries can aid in consolidating learning and transferring knowledge across experiments (Matschoss and Heiskanen, 2017; Seyfang et al., 2014). Importantly, intermediaries also build supportive networks and alliances (Leroux, 2007; Seyfang et al., 2014) and act as translators between bottom-up initiatives and local governments (Ehnert et al., 2021; Hernberg, 2022). They further engage in brokering between local initiatives, governments, and incumbent actors (see Hargreaves et al., 2013), for example, by representing and advocating on behalf of local groups and negotiating their legitimacy (Drivdal, 2016; Hermelin and Rämö, 2017) and by stimulating social inclusion, building trust, and fostering interaction among the diverse actors involved in urban transitions (Kilelu et al., 2011; Pratiwi, 2020). Moreover, intermediaries can engage in securing support for local initiatives (Ramos-Mejía and Balanzo, 2018) and aid the diffusion of local innovations (Cairns et al., 2023; Mignon and Bergek, 2016). Furthermore, they can address structural barriers by lobbying and reorchestrating incumbent actors for structural change (e.g., Matschoss and Heiskanen, 2018; Hyysalo et al., 2022). While intermediaries in local bottom-up experimentation can be external actors, intermediation also occurs within the local communities themselves, often being performed by peers or through peer-created digital platforms (Bakardjieva, 2006; Hyysalo et al., 2018; Meelen et al., 2019).

A broad array of intermediaries has been found to exist between the industry and consumption sides of innovation intermediation and across regime and niche intermediaries in transitions (Kivimaa et al., 2019a). Across such areas, the formalization, continuity, agency, legitimacy, and resources of intermediaries differ notably, which inevitably affects the scope of intermediation engagement and the capabilities of intermediaries to perform their work (see Hodson and Marvin, 2010; Hyysalo et al., 2022; Mignon and Kanda, 2018). Industry, regime, and system intermediaries typically have more legitimate, established, and formalized positions (Pollock and Williams, 2016; Williams et al., 2005) and the mandate to change and reconfigure incumbent actors and networks from within (Kanda et al., 2020; van Lente et al., 2003). Contrarily, the position and agency of intermediaries working in emerging niches in transitions are often precarious and constantly negotiated (Hargreaves et al., 2013). Similarly, intermediary activities related to consumers and citizen initiatives tend to take place as voluntary or more informal and unrecognized additions to the actors' primary work (Boon et al., 2011; Hyysalo et al., 2018; Mignon and Bergek, 2016). In advancing local experimentation, different intermediaries' positions may also be on a spectrum between these two ends. For example, intermediaries may have financial and contractual ties to local governments or incumbent actors while having an agenda and a remit to support bottom-up experimentation (Hernberg, 2022). Even if such intermediaries operate at a local scale, their work may involve multi-scalar and multi-domain interaction (Wittmayer and Loorbach, 2016) and reflect broader issues concerning policies, regulations, power relations, and the conventions of incumbent actors. As we argue next, the ways by which they engage in intermediation also merit further attention.

Finally, local bottom-up experimentation underscores the materialities and non-human entities involved in how intermediation is carried out (Contesse et al., 2021; Latour, 1993). The instruments by which knowledge and action can be carried out between actors—such as space blueprints, contract forms, tutorial videos, 2b2 matrixes, and Internet pages—are often of vital importance for actors' capacities to intermediate (e.g., Pollock and Williams, 2016). These instruments often make the aggregation of data and knowledge possible, turning them into knowledge repositories that gain furthered mediating capacities. This is most notable in Internet communities that are able to cumulate solutions and knowledge, which makes wide, many-to-many intermediation possible (Hyysalo, 2021; Meelen et al., 2019; Peuckert and Kern, 2023).

2.4. The research gap in understanding the intermediation modes in local bottom-up experimentation

Due to the impressive range of contributions that intermediaries make (detailed in Sections 2.1–2.3), their activities are commonly

presented as lists of what they work on, what they mediate, and what actors they mediate between (Bessant and Rush, 1995; Howells, 2006).[1] Gregor (2002) has characterized such listings as "naming theory," explaining *what there is*. Gregor sees naming theories as a stepping stone for more encompassing theory building, such as analytically ordered typologies and the elaboration of related *how* and *why* questions. In intermediation literature, analytical ordering has emerged through conceptualizing intermediaries based on broader theoretical frameworks, for example, in typologies of transition intermediaries that are premised on niche and regime levels and interaction (Kivimaa et al., 2019a) or different orders of systemic intermediation (Kanda et al., 2020). Whilst valuable, such theory-based conceptualizations about differences in intermediation contexts and contents step over the questions of *how* intermediation practice or "work" takes place (Moss, 2009). Furthermore, the terminology used across these studies could be clearer.

Earlier work has clarified the mechanisms involved in brokering, differentiated between transfer, matchmaking, and coordinating (Spiro et al., 2013; Kanda et al., 2022). Whereas brokering remains the most recognized way to intermediate, the literature covered in Sections 2.1–2.3 points to the importance of other ways to intermediate between actors by shaping the relations between them or the actors involved in relation to others. These ways include material and cultural shaping (e.g., Boon et al., 2011; Barnes, 2016; Contesse et al., 2021), facilitation and capacity building (e.g., Bakardjieva, 2006; Boon et al., 2011; Smith et al., 2016), and negotiating structural conditions beyond brokering (e.g., Hodson and Marvin, 2009; Matschoss and Heiskanen, 2018; Dotson, 2016).

To better address this research gap, we depart from the earlier work of Stewart and Hyysalo (2008). They underscored that besides "brokering," what they call "configuring" and "facilitating" characterize other facets of engagement by intermediaries in local experimentation with new technologies and practices. Yet, this conceptualization overlooks the capacity and need of intermediaries to (re)negotiate structural conditions, which the research on transition and urban intermediaries makes evident (see Sections 2.2–2.3). To further elaborate this facet of urban intermediation, we draw on Hernberg's (2022) recent work on intermediation in urban redevelopment that characterizes this as "structural negotiating" (see Section 3).[2] Both of these works conceptualize brokering similarly, as well as what they term "facilitating" and "building capabilities," respectively. Stewart and Hyysalo used the term *role* to imply the intermediaries' patterned actions and interactions (Stewart and Hyysalo, 2008; see also Hernberg, 2022). Yet, as the plentiful research on transition intermediaries has used the term *role* with structural-functionalist undertones (referring to roles in systems change) and as the term *mechanism* also has its own sets of connotations in social theory, we hereon prefer to use the term "*mode* of intermediation" in order to clarify that our interest lies in how intermediaries engage in the mediation they perform.

Thus, to improve the conceptual clarity regarding intermediary engagements, we propose an updated framework comprised of four modes, which we describe below. Within each mode, we further articulate the activities found at different scales of action (see Fig. 1 and Table 2). As some intermediation activities include aspects related to more than one mode of engagement, there are some empirical overlaps and complementarities between the modes that we further discuss in Section 5.

3. An updated framework of intermediation modes

(1) Brokering

Brokering is an intermediation mode focused on building relations between different actors and actor groups—such as local communities, incumbent actors, governments (e.g., Hargreaves et al., 2013; Hernberg, 2022), or the users and suppliers of technology (e.g., Stewart and Hyysalo, 2008)—as well as between actors, resources, skills, and knowledge (Kanda et al., 2022; Kivimaa et al., 2019a). Conceptually, brokering emphasizes that "bridging" and establishing links between actors is a specific mode of intermediation that requires particular skills and considerations of the linking work itself, the actors and entities involved, and the benefits (economic, social, or cognitive) that the intermediary may seek (see Spiro et al., 2013). Thus, brokering can be neutral but may also be guided by a particular remit of the intermediary and may occasionally serve to enhance the intermediary's position (Hakkarainen and Hyysalo, 2016; van Veelen, 2020).

By brokering, intermediaries advance and steer the collaboration, partnerships, and networking between different actors and groups (Bessant and Rush, 1995; Klerkx and Leeuwis, 2009; Hodson and Marvin, 2009; Hargreaves et al., 2013). This entails, for example, curating and matchmaking (Hernberg, 2022), introducing new actors into projects (Stewart and Hyysalo, 2008), and advocating on behalf of certain groups (Hakkarainen and Hyysalo, 2016; Stewart and Hyysalo, 2008). Intermediaries also engage in information brokering, marketing, and providing value evidence (Howells, 2006; Hyysalo et al., 2018).

While scholars have previously observed complex brokering between multiple actor groups and related multi-directional games (Williams et al., 2005), this complexity is accentuated in the intermediation between actors (such as local residents, municipalities, and private companies) and their interests in local experimentation contexts (Hernberg, 2022; Hodson et al., 2013). These contexts tend to feature challenging dynamics between actor groups, including socio-economic distance, asymmetric power relations, diverging interests and values, and communication challenges (Andres, 2013; Hernberg, 2022). Hence, intermediaries build an alignment between actors and groups (Hernberg, 2022; Hodson and Marvin, 2009); help communicate, translate, and build trust; and make different voices and needs heard and understood (Hernberg, 2022).

[1] For a widely cited example, Howells (2006) listed: (1) foresight and diagnostics, (2) scanning and information processing, (3) knowledge processing and (re)combination, (4) gatekeeping and brokering,(5) testing and validation, (6) accreditation, (7) validation and regulation resources, and organizational development, (8) protecting the results, (9) commercialization, and (10) evaluation of outcomes.

[2] Hernberg's characterization of intermediation roles is based on a review of urban transition intermediation literature and related literature from architecture and participatory design, and empirical work on urban redevelopment.

(2) Configuring

Configuring is an intermediation mode that entails the material and symbolic alteration of technology (Hakkarainen and Hyysalo, 2016; Stewart and Hyysalo, 2008), materials, or spaces (Hernberg, 2020) including their forms, content, use, and interpretation (Hakkarainen and Hyysalo, 2016; Stewart and Hyysalo, 2008). The etymological background of the term *configuring* refers to "figuring with," i.e., forming and shaping elements into assemblies and defining or enabling their functioning, use, and users (Hyysalo, 2010). Intermediaries have been recognized to engage in pre-, de-, re-, and co-configuring systems, interfaces, and spaces for (other) users. Some intermediaries are also involved in "configuring the user" (Woolgar, 1991), i.e., finding out about the user's needs and requirements and estimating the types of user and user engagements (Hyysalo, 2010).

In the intermediation of local experimentation, configuring can be understood similarly. Yet, we expand the phrase "configuring the user" to "configuring actors" as intermediaries also configure actors other than users, including governmental and incumbent actors, attempting to reflect their goals and expectations and often seeking to configure new actor roles or ways of engaging (Hernberg, 2021; Hyysalo et al., 2018). Furthermore, configuring can concern social practices and organizational patterns, such as operational models, contract terms (Hernberg, 2020, 2021), or codes of conduct related to use or usage (Hakkarainen and Hyysalo, 2016; Stewart and Hyysalo, 2008).

(3) Structural negotiating

As discussed in Sections 2.2–2.4, local experimental initiatives may struggle to prosper within the prevailing structural barriers, including formal regulations, conventional business models, and entrenched patterns of power, expertise, knowledge, thought, and action (e.g., Dotson, 2016). Thus, intermediaries' engagement in renegotiating these conditions may be necessary in order to support experimentation (e.g., Matschoss and Heiskanen, 2017, 2018). Intermediation in local bottom-up experimentation features plenty more negotiation and more varied negotiation that is not adequately covered by either the brokering or configuring modes of intermediation. Following Hernberg's work (2022), we conceptualize this mode of intermediation as "structural negotiating".[3]

Intermediaries may address and renegotiate structural conditions that range from strategic questions to regulatory and operational questions (Hernberg, 2022). For example, intermediaries engage in negotiating and aligning visions (Hodson and Marvin, 2009; Kivimaa, 2014), advocating and influencing policy development (Kivimaa, 2014; Kivimaa and Martiskainen, 2018a; Matschoss and Heiskanen, 2018; Smith et al., 2016), and linking local projects to larger-scale or longer-term strategies or planning (Hodson et al., 2013). Intermediaries also negotiate the applications of and exemptions from regulations, develop creative ways to operate within existing regulatory frameworks, and identify incentives for new alternatives (Hernberg, 2022). Structural negotiating further aims to affect and disrupt existing power relations and conventional practices (Hargreaves et al., 2013; Matschoss and Heiskanen, 2018; Smith et al., 2016) and contribute to realigning goals and structures (cf. Barnes et al., 2018). Intermediaries may also address internal and operational issues within incumbent organizations, such as operational or business models and contract terms and conditions (Hernberg, 2022; cf. Hargreaves et al., 2013), which are tied to the deeper conventions of the organizations and their industries. Such different aspects of structural negotiating by intermediaries also signal that this mode allows engagement across different system levels (cf. Kanda et al., 2020), ranging from organizational-level negotiations to more systemic negotiations involving local policymakers and governments.

As transition processes are slow, complex, and long term, the same intermediaries are hardly ever involved throughout the whole transition (Hyysalo, 2021; Hyysalo et al., 2022). Moreover, the agency of intermediaries positioned close to or within users and local communities to alter structural conditions varies depending on their affiliation, resources, and the continuity of their involvement (Parag and Janda, 2014; van Veelen, 2020). Hence, intermediaries' contribution to structural change may take the form of "small wins", compromises (Hernberg, 2021, 2022), or additional impetus for change among other actors (Hyysalo et al., 2022).

(4) Facilitating and capacitating

The fourth intermediation mode, which we term "facilitating and capacitating", concerns developing enabling conditions (Stewart and Hyysalo, 2008) and "building capabilities" (Hernberg, 2022; cf. Huybrechts et al., 2018) in order to advance learning, dialogue, experimentation, and innovative activities. Under this mode, we understand facilitating in line with the understanding of Stewart and Hyysalo as "providing opportunities to others" and creating social, cognitive or physical "spaces" (2008: 306). This mode includes diverse knowledge and learning-related activities such as educating, advising, and training (Hakkarainen and Hyysalo, 2016; Hernberg, 2022; Stewart and Hyysalo, 2008); knowledge exchange (Dickey et al., 2022); facilitating collaborative learning among local actors, incumbents, and governments (Hernberg, 2022; Lähteenoja et al., 2022); and producing, gathering, and disseminating knowledge (Hernberg, 2022; cf. Hargreaves et al., 2013). The mode also includes gathering and distributing resources (Stewart and Hyysalo, 2008) in order to aid action taken by others.

Fig. 1. The figure outlines the four intermediation modes, illustrated by colored circles, and key activities, marked by words colored in line with the respective modes. The figure also demonstrates overlaps between modes and that different activities can simultaneously include aspects of several modes.

[3] Stewart and Hyysalo (2008) subsumed structural negotiating under brokering and configuring. Most likely this was because the technologies that they studied either featured a conspicuous lack of structural barriers or institutionalized barriers beyond most intermediaries' influence. However, in a careful reading of the longer versions of their work, this subsuming was not fully warranted. Structural negotiating beyond brokering or configuring appears to be there as well: Intermediaries pursued alignments with and exceptions to standards, built coalitions to gain more legitimacy for alterations, and sought meetings and discussions with incumbents (Hyysalo, 2010; Williams et al., 2005).

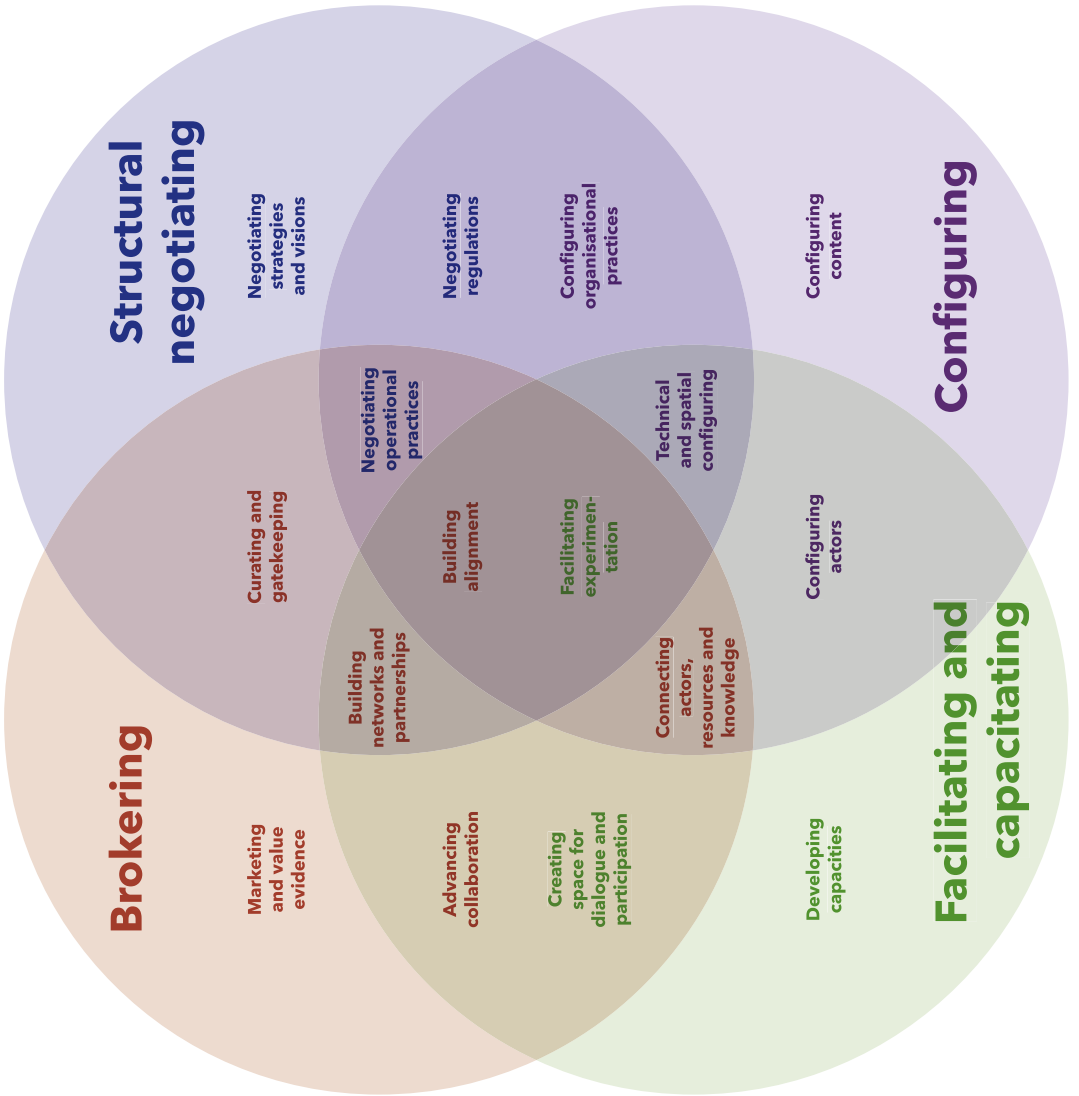

Fig. 1. The updated framework of intermediation modes.

4. Methods and data

Having outlined the updated framework of intermediation modes, we now aim to understand how the modes are operationalized in practice in different contexts. To do this, we re-analyze two long-term studies on intermediation in urban redevelopment and energy transitions. Both studies were qualitative, based on ethnographic, interview, and practice-based methods. Table 1 summarizes the data gathered in the two studies.

The first study investigated **intermediation in the "temporary use" of vacant spaces in bottom-up urban redevelopment**. The study included practice-based research on intermediation work conducted during 2016–18 in Helsinki's metropolitan area (in Finland) (Hernberg, 2021; Hernberg and Mazé, 2017) and the interviews of intermediaries in four European cities (Hernberg, 2020). Data from the study include ethnographic field notes and reflections, transcripts of workshops and meetings, a participant survey, and semi-structured interviews with two participant groups (30 to 45 min long) and five intermediaries (1 to 2 h long). The data were analyzed through thematic analysis (Ryan and Bernard, 2003) and process coding, focusing on intermediary activities, the intermediaries' relations with the main stakeholders, and the conditions for temporary use.

The second study investigated **the intermediation of hybrid renewable energy in housing by users.** The first dataset, from 2011 to 2012, is based on Internet ethnography on Finnish renewable energy discussion forums and semi-structured interviews with residents with hybrid heating systems. This data is complemented by a second dataset from 2022 to 2023 that includes semi-structured interviews (30 to 120 min long) on intermediation and hybrid renewables in Finland, involving 55 informants. The data were coded focusing on practices related to heating and technology usage, the support given and received, the knowledge constructed and shared inside communities, and the informants' information searches and learning.

The original findings of both studies have been published elsewhere (see Table 1). In this paper, we report the findings of a second-stage analysis in which we reanalyzed the data from both studies with respect to the four intermediation modes presented in Section 3. We interrogated how the modes were operationalized in different contexts, what contextual differences and similarities were revealed in the nature and "shape" of intermediation, and how the modes and comprised activities connected and overlapped. Consequently, we identified context-specific intermediation tasks and grouped them into more generic activity categories inside each intermediation mode.

The different levels of abstraction generated through this re-analysis are presented as follows: Fig. 1 above outlines the four modes and the generic activities they comprise, displaying the overlaps between the modes. The next section elucidates the four modes in two contexts based on the intermediation studies examined. At the end of Section 5, Table 2 adds a more detailed listing of the context-specific tasks found inside the activity categories.

5. Modes of intermediation in practice: Empirical illustrations of the framework

In this section, we elucidate the four intermediation modes in practice based on the two studies of intermediation in urban redevelopment and energy transition.

5.1. *The intermediation of temporary use in bottom-up urban redevelopment*

The need for intermediation to enable alternative approaches to conventional modes of urban planning and development is becoming recognized (Jégou et al., 2018; Patti and Polyak, 2015). Such approaches include the "temporary use" of space, which is a practice of reactivating vacant spaces and properties for which decisions on their future development are pending (Bishop and Williams, 2012; Madanipour, 2017; Oswalt et al., 2013). Temporary uses are recognized as local, experimental transition initiatives (Grandin and Sareen, 2020) that allow a broader range of local actors and communities to engage in shaping and activating spaces and neighborhoods (Andres, 2013). Thus, they also provide opportunities for experimentation and critical alternatives to neoliberal urban development (Colomb, 2012; Németh and Langhorst, 2014). Consequently, temporary use is considered a form of iterative and bottom-up planning and development that may contribute to a broader reconfiguration of formal planning approaches (Andres and

Table 1
A summary of the data from the studies examined.

	Study 1: The intermediation of temporary use in bottom-up urban redevelopment	Study 2: The intermediation of hybrid renewable energy in housing by users	Total
Data types:			
Ethnographic observation, including workshops, meetings, etc.	22 months	12 months	Approx. 34 months
Semi-structured interviews (audio-recorded and transcribed)	6	75	81
Document materials	1000 pages	>1000 pages	>2000 pages
Survey	10 respondents		
Timeline	2016–18	2011–22	
Publications	Hernberg, 2020, 2021, 2022; Hernberg and Mazé, 2017	Hyysalo, 2021; Hyysalo et al., 2013a,b, 2018, 2022; Hyysalo and Juntunen, 2024; Numminen et al., 2023	

Kraftl, 2021; Honeck, 2017; Oswalt et al., 2013). Despite the recognized potential, temporary uses face many barriers. These include stringent zoning practices, ambiguous building regulations, the conventions of real-estate business, and the multiple interests of the actors involved (Gebhardt, 2017; Hernberg, 2022).

Our study investigated the intermediation of temporary use in the Helsinki metropolitan area (Hernberg, 2021; Hernberg and Mazé, 2017) and in four Central European cities: Ghent, Bremen, Nantes, and Riga (Hernberg, 2020). In these cities, intermediaries were involved in initiating and advancing temporary-use projects, such as repurposing suburban office buildings into artists' ateliers, reactivating former industrial harbors, or providing neighborhood residents with local places for community activities. The intermediaries in the study included an NGO founded by urban activists, a semi-public urban development agency, a consultancy commissioned by a municipality, and civil servants working as "neighborhood managers." Some of the intermediary actors in the study were architects for whom advancing temporary use was seen as an opportunity for doing architectural work that goes beyond the constraints of typical market-driven urban development, motivated by sociopolitically and environmentally driven goals.

Below we illustrate the four modes of intermediation in the temporary-use study.

Brokering in temporary use

Temporary use is typically characterized by socioeconomic distance, mismatching interests and values, power asymmetries, and communication gaps between municipal actors, property owners, and potential temporary tenants (e.g., Andres, 2013; Hernberg, 2022). In the study intermediaries were engaged in matchmaking, networking, finding synergies among the potential user groups, and solving some disputes between users and other local stakeholders. They negotiated with the owners of vacant properties and municipal actors about their priorities and preferences, for example, those concerning curating and selecting temporary users and the types of activities for given locations (Hernberg, 2020, 2021; Hernberg and Mazé, 2017). In so doing, the intermediaries were necessary for bridging asymmetries and gaps, building trust and understanding among the actor groups, and in particular, voicing the needs and concerns of the potential users who did not have decision-making power regarding the use of vacant spaces. This allowed opening up access to vacant spaces for new types of users and building new partnerships across the different actor groups, such as new types of rental agreements between owners and users or other forms of support and exchange between the users and municipalities.

For example, many artists and event organizers had faced difficulty in their search for suitable work or event spaces, facing rejection from property owners (Hernberg, 2021). Some owners preferred to hold properties vacant rather than adjust rental prices. The intermediaries had to persuade these property owners to overcome their prejudice toward artists or cultural actors who were not their typical tenants. In addition, intermediaries engaged in negotiating public support for such actors.

The intermediaries' brokering also converged with the configuring and structural negotiating modes of intermediation, for example, when reconfiguring spatial layouts for the new users and usages and, consequently, negotiating the related regulatory issues.

Configuring in temporary use

Our original analysis on intermediation in temporary use (Hernberg, 2022) did not articulate configuring as such due to an explicit focus on sociopolitically engaged intermediation work. In the re-analysis done for this paper, spatial reconfiguring in particular was recognized as the work included adapting spaces to new uses.

As an example of spatial reconfiguring, some of the architect-intermediaries engaged in designing and implementing small-scale renovations and modifications, such as adapting harbor warehouses into offices for cultural actors or dividing up large open-office spaces for new types of use and for users needing to rent smaller spaces (Hernberg, 2020, 2021). In some of the sites, the intermediaries also encouraged the users to do modifications or maintenance work themselves in exchange for a lower rent. The intermediaries also engaged in "configuring actors": For instance, they configured entirely new actor roles, such as that of a rental operator specialized in temporary rentals (Hernberg, 2021).

The intermediaries further configured more flexible rental models to better accommodate temporary use, which often requires more incremental, smaller-scale, and shorter-term contracts than conventional office rentals require. Moreover, one of the intermediaries advanced a "co-development model" in which the temporary users would prototype and experiment with longer-term usages for the property and, eventually, earn part of any rise in property value (Hernberg, 2020). Inevitably, such configuring work was also linked to structural negotiating with the actors holding decision-making power over such operational models and contracts.

Structural negotiating in temporary use

In temporary use, the structural constraints vary depending on the local regulatory and market contexts. For example, in Finland, temporary use is as yet a relatively uncommon practice that tends to be disregarded by the conventional private real-estate sector. The strict interpretation of building regulations and zoning plans brings further impediments. In turn, some of the other European cities in the study, such as Ghent in Belgium, had developed more flexible policies that nurture and accommodate temporary uses (Hernberg, 2020).

The temporary-use intermediaries engaged in renegotiating structural conditions ranging from the minor adjustments of contract terms to exemptions from regulations and further debating planning visions or advocating policy changes concerning temporary use. Most of the intermediaries engaged in reinterpreting building regulations and negotiating exemptions from regulations to enable the temporary repurposing of spaces. For example, the intermediaries in Ghent had the mandate to negotiate three-month exemptions from standard regulations based on a municipal strategy to promote experimentation (Hernberg, 2020). Typically, the intermediaries also negotiated operational issues (such as business models and contract terms) to accommodate temporary use, touching on some of the incumbent companies' entrenched conventions regarding real-estate management.

The structural negotiating occasionally overlapped with brokering. For example, in brokering the entry of new actors into urban development through temporary use, a Finnish intermediary also tried (with support from municipal officers) to instill more profound changes in the real-estate companies' approaches to vacancy that went beyond individual rental contracts, although access to

negotiating with higher-level representatives of the largest real-estate investors was limited (Hernberg, 2021).

Facilitating and capacitating in temporary use

As temporary use deviates from the established conventions and practices of urban planning and development, intermediaries sought to facilitate and capacitate actors by creating conditions for collaborative learning, experimentation, and the expression of diverse views, in particular, by encouraging users' initiatives and responsibility in temporary use.

Concerning learning, temporary use itself was considered as a "space" that encouraged dialogue and knowledge exchange between the different actor groups, generating new insights among them. For example, experimental user communities have know-how that is relevant to property owners (Alatalo and Jokinen, 2017). In turn, the intermediaries also brought in their knowledge and experience of temporary use, for example, by giving technical, legal, or contractual advice to users. The intermediaries also encouraged the users to take more responsibility and initiative in developing new activities in the vacant spaces. In addition, they gathered and disseminated knowledge beyond individual temporary-use projects, for example, by participating in international peer networks and publishing books and reports (Hasemann et al., 2017; Jégou et al., 2018).

The intermediaries facilitated prototyping new types of uses for spaces, testing new (operational or business) models, and evaluating the outcomes. While configuring was also necessary for tinkering with the spatial and technical aspects of experimentation, the facilitating and capacitating focused on advancing the actors' capacities to pursue this collectively.

Overall, successful intermediation in the study required simultaneous engagement across the different modes as many intermediation activities included aspects related to several modes. This highlights the need for the diverse skills and capabilities necessary to engage in the different modes. For example, architectural skills and experience were highly useful in reconfiguring spaces, interpreting regulations, and carrying out negotiations with municipal administration and real-estate actors in the temporary-use study. Yet, renting spaces, configuring contract terms and business models, or engaging with a broad range of stakeholders and complex social situations would also benefit from other kinds of skills and expertise. While there were limitations, many of the intermediary organizations in the temporary-use study had paid attention to recruiting diverse personalities and skills. As one of the intermediaries mentioned, referring to the different backgrounds of her colleagues and their engagements: "We have all been cast quite well in our neighborhoods. This is a fit." (Hernberg, 2020: 219).

5.2. The intermediation of hybrid renewable energy in housing by users

The importance of intermediation in the adoption and diffusion of renewable energy technologies (RETs) in the housing stock is widely recognized (Heiskanen et al., 2011, 2014; Kivimaa and Martiskainen, 2018b; Mignon and Bergek, 2016). Alongside their marketing and sales efforts, suppliers, retailers, and other commercial actors (such as local energy companies) conduct intermediation towards consumers and housing associations adopting renewables. Moreover, most countries have national and local energy counseling agencies. Professional associations, the technical press, and mass media also tend to inform consumers, installers, and installation companies about renewable installations, their suitability, and payback times. However, the resulting ecologies of intermediation tend to have a piecemeal and partial character, which leaves some aspects of the installations non-mediated (Hyysalo et al., 2022). These aspects typically include information about realized payback times, reseller and installer reputations, operating and optimizing the systems in particular locations, maintenance, and troubleshooting (Hyysalo, 2021; Hyysalo et al., 2018). Such non-mediated aspects are particularly salient regarding hybrid heating arrangements both in detached homes and apartment buildings as most suppliers, resellers, and installers specialize in only certain types of renewables such as photovoltaics, solar heaters, ground source heat pumps, or air source heat pumps.

In our studies of owner-occupied detached houses and apartment buildings in Finland, intermediation among users has recognizably emerged to fill in for commercial and government-affiliated intermediaries. User intermediation can take many forms, ranging from neighborly exchanges to local networks and recorded discussions in wide, Internet-based forums (Heiskanen et al., 2015; Hyysalo, 2021; Hyysalo et al., 2013a,b; cf. also Dewald and Truffer, 2011, 2012; Meelen et al., 2019).

Brokering in hybrid renewables

Brokering by users in regard to renewables is most salient in Internet discussion forums. A common form of information brokering is providing instructions and summaries of long and complex reports, selectively distilling the most relevant aspects for peers, often translating them into more accessible terms (Hyysalo, 2021). These exchanges regularly involve pointers to selected earlier postings and discussion strings in order to build links. Discussants also establish connections by "pinging" peers who might be interested and have the sought knowledge and expertise or may have tackled a similar issue before (Hyysalo et al., 2013a,b). Such brokering of connections is almost always selective and accentuated with hybrid installations that often require the local integration of renewables. Besides connecting informants, links to other intermediaries and suppliers (such as installers and installation companies with the capacity and willingness to pursue non-standard solutions) are solicited (Hyysalo, 2021).

Configuring in hybrid renewables

Material engagement in configuring hybrid RET arrangements has occurred among people living close to each other, yet other types of configuring were found more common in user intermediation. The most important configuring that users performed was setting up, moderating, and managing large Internet discussion forums and various other social media groups that connected the geographically separated users and cumulated information and advice in readily accessible repositories. These forums configured the users from isolated individuals grappling with their heating choices to members in large information repository and advice community (Hyysalo, 2021; Hyysalo and Juntunen, 2024). As the Internet forums have grown, these platforms have become non-human intermediaries featuring a wealth of instructions for diagnosing, optimizing, and improving systems and system combinations. Whereas such instructions, per se, are best seen as facilitating and capacitating intermediation, they bifurcate with configuring intermediation once

instruction and implementation happen step by step, for instance, via a guide-through video (Hyysalo, 2021; Hyysalo et al., 2018; Numminen et al., 2023).

The user intermediation in the Internet communities further features configuring the user and usership by discussing and displaying their positive and negative experiences and actions with a RET system's purchase, use, troubleshooting, and maintenance. Thereby, peers effectively contribute to a suggestive image of the usership of RETs in terms of orientation, competencies, routines, and ways of maintaining awareness of the systems (Hyysalo, 2021).

Configuring intermediation features some overlaps with brokering and low-level structural negotiating intermediation. For instance, in DIY installations it is common that skilled DIY builders install all the electrical wiring themselves except for the final connection to the main switch and then invite a trusted certified electrician to just inspect and test the installation in order to authorize it (Hyysalo et al., 2013a,b). On occasions, the regulations are bent beyond what could be legally justified, for instance, building a duly certified renewables integration with a temporarily detached bootleg part that is left to user control and responsibility regarding when or if it is connected.

Structural negotiating in hybrid renewables

Discussion forums intermediate a large body of information and advice on the realized installations of RETs, their value, and payback. Such evidence of realized value has counterbalanced the suppliers' performance metrics, optimized to test conditions. Additionally, the evidence has complemented and questioned the models and estimations of the energy savings provided by research institutes and the technical press (Hyysalo, 2021). Such data has opened the discourse on reconsidering model-based assumptions about country-specific RET performance, such as solar photovoltaics yield in cold, snowy Finnish springtime, the higher-than-expected performance of air source heat pumps, and the longer-than-assumed replacement cycles of next to all RETs. The presence and aggregate effects of large peer discussion repositories have affected how RETs are perceived among citizens and media, and have contributed to a shift in the general perception of RETs, shifting from exceptional novelties to common-sense solutions (Hyysalo, 2021).

At the same time, hardly any explicit strategic and regulatory structural negotiating can be found in user intermediation. Instead, those negotiations are performed by industry associations for each RET and their general association and through governmental intermediaries (Hyysalo et al., 2022; Kivimaa, 2014).

Facilitating and capacitating in hybrid renewables

Facilitating and capacitating intermediation among renewables users takes many forms. As noted above, user postings feature comprehensive instructions related to numerous aspects of RET installations in housing. This has created a recognizable and accessible space in which others can learn about the systems and their usage. It has been particularly important for translating generic technology characteristics and instructions to country- and location-specific conditions, such as colder-than-specified usage conditions and snowy conditions (Hyysalo, 2021).

Furthermore, Internet forums create a legitimate space for seeking reliable information and asking further questions. An important aspect of this information is that other intermediaries, such as government agencies, do not have the remit to provide information about RET brand reputations, recommended systems, the exact scoping for a particular site, installer track records, contract-related issues, and so on. While suppliers and resellers could provide such information, consumers have good grounds to suspect that they might provide it in a self-serving and edited manner (Hyysalo et al., 2022). In all user interactions, both locally and in online communities, a space for gaining knowledge and voicing concerns and articulating critique is created. The discussion threads and live exchanges create a space in which to observe and learn how to formulate concerns and critiques and target them effectively.

5.3. Intermediation profiles and the complementarity of modes

Based on the analysis of intermediation modes in the two studies, we identified some similarities and differences between the two studies regarding the emphasis on the modes and the scope of activities inside modes. The resulting intermediation profiles are illustrated in detail in Table 2 below. As the table shows, the intermediation in both studies featured plentiful facilitating and capacitating. While brokering intermediation was also strong in both studies, in temporary use it was more focused on building alignment and advancing collaboration among the complex range of participants, whereas intermediation in the renewables study focused more on enabling connections among the RET users and links between the demand and supply of RETs. Configuring intermediation was somewhat more limited in the renewables study, predominantly featuring technical configuring in order to achieve hybrid-renewable installations that work. In turn, the temporary-use study involved spatial and organizational configuring in order to tailor the vacant spaces and related contractual aspects, enabling new usages of the spaces. Both studies were similarly attuned to configuring the users (i.e., identifying their needs, preferences, and potential types of engagement), but the temporary-use study broadened this to configuring other actors, including incumbents.

The clearest difference in intermediation profiles can be seen in structural negotiating intermediation, which was relatively strongly featured in the temporary-use study, particularly its regulatory aspects, but remained modestly featured in the user intermediation of renewables. This is unsurprising given the limited access of user networks to negotiations with incumbent actors. Other intermediary actors, such as industry associations, focus specifically on those aspects, albeit from a different stance. Stronger connections to installers and industry associations could potentially render user intermediation stronger in configuring and structural negotiating, but regarding the overall compositions of hybrid heating arrangements in particular, this could be difficult to achieve as resellers, industry associations, and even installers tend to be specialized by technology area. In turn, the architect-intermediaries in the temporary-use study were better equipped for structural negotiating, partly due to their traditional positioning between different clients, governments, and private real-estate actors. Yet, some of these intermediaries' access to necessary negotiation tables was

Table 2
The four modes of intermediation and the comprised activities and tasks.

Mode	Activity	Task	TU	RET
BROKERING	**Building networks and partnerships**	Matchmaking	x	x
		Introducing new actors into a project	x	x
		Advocating and representing on behalf of certain groups or actors	x	(x)
		Curating and gatekeeping	x	
	Advancing collaboration	Dividing responsibilities	x	
		Setting local rules		x
		Communicating and translating	x	x
		Co-designing	x	(x)
	Building alignment	Aligning interests and resolving conflicts	x	
		Building trust	x	
	Connecting actors, resources, and knowledge	Identifying needs and connecting with supporting actors / resources	x	x
		Editing information to make it more accessible		x
		Articulating demand from users to incumbent and government actors	x	x
	Marketing and value evidence	Marketing spaces	x	
		Providing evidence of realised value in local conditions		x
CONFIGURING	**Technical and spatial configuring**	Configuring technical arrangements of spaces	x	(x)
		Configuring DIY technical installations in housing		x
		Setting up and managing Internet discussion forums and groups		x
		Configuring instructions for diagnosing and optimizing RET systems		x
		Reconfiguring and repurposing spatial setups	x	
	Configuring actors	Configuring users' needs and requirements and estimating the types of users and user engagements	x	x
		Estimating the types of users and user engagement with RET systems		x
		Configuring the goals, expectations, and priorities of other actors	x	
		Configuring new actor roles and introducing new actor configurations in order to fill gaps in the ecology of intermediation	x	x
	Configuring organisational practices	Reconfiguring operational or business models	x	
		Reconfiguring contract terms and conditions	x	
	Configuring content	Articulating project briefs or implementation plans	x	
STRUCTURAL NEGOTIATING	**Negotiating strategies and visions**	Negotiating and aligning visions	x	
		Advocating policy development	x	
		Linking bottom-up engagement to larger-scale or longer-term urban development	x	
	Negotiating regulations	Negotiating exemptions from regulations or creative solutions within the existing regulatory framework	x	
		Identifying incentives for alternatives	x	
	Negotiating operational practices and conventions	Negotiating models (e.g., operational or business models)	x	x
		Negotiating contract terms and conditions	x	
		Providing evidence that counterbalances model-based assumptions of new technologies		x
		Contributing to a shift in the perception of new technologies		x
FACILITATING AND CAPACITATING	**Developing capacities**	Creating space for searching and gaining knowledge		x
		Providing advice and instructions	x	x
		Providing peer support	(x)	x
		Encouraging users to take the initiative and responsibility	x	x
		Creating a space for dialogue and learning between different actors/groups	x	x
		Gathering and disseminating knowledge	x	x
	Creating space for dialogue and participation	Creating space for voicing concerns and articulating critique	x	x
		Organising participatory activities	x	
		Engaging in a dialogue with residents or local actors	x	x
	Facilitating experimentation	Enabling experimentation	x	x
		Facilitating learning by doing	x	x

The table demonstrates intermediary engagements within the four modes identified in the two empirical studies. The engagement under modes is divided into categories of activities and context-specific tasks. The two columns on the right indicate the different intermediation profiles in the two studies.
TU = Temporary use of vacant space – Study 1.
RET = Renewable energy technology – Study 2.
[Modes of intermediation: How intermediaries engage in advancing local bottom-up experimentation Manuscript Number: EIST-D-23-00412R2 Hernberg, H & Hyysalo, S]

limited.

Both studies also demonstrate overlaps and complementarities between the intermediation modes. For example, we recognized that "configuring actors" converged with brokering intermediation in terms of aligning and negotiating the actors' needs and preferences. Additionally, technological, spatial, and social configuring in the two studies featured some structural negotiating concerning the legitimacy of the (re)configurations being considered. Moreover, both studies demonstrated how facilitating and capacitating in part enabled the actors to perform technological or spatial configuring.

The differences in intermediation profiles across the two studies are not only contextual. Although focusing on advancing local bottom-up experimentation, the intermediary actors in the two studies differed in terms of their affiliations, funding sources, resources, and access to different networks. The temporary-use intermediaries were professionals with either public funding (even if some of it was only project based) or income from services targeted to real-estate owners. In contrast, the user intermediaries in the renewables study were citizens without formal affiliation with incumbent organizations. Such differences inevitably affect the nature and shape of intermediation (e.g., Mignon and Kanda, 2018), as well as the longevity of intermediaries' work (Hodson and Marvin, 2010; Kant and Kanda, 2019).

6. Discussion and conclusions

Our point of departure in this article was the observation that it matters *how* intermediaries (are able to) pursue their mediation, not just what they mediate and between which actors. Characterizing the *modes* of intermediation thus forms our primary contribution against the backdrop that research on intermediary activities in innovation, urban development, sustainability transitions, and local experimentation already characterizes well what intermediaries mediate and the various relations in which the intermediation takes place (cf. Howells, 2006; Kanda et al., 2020; Kivimaa et al., 2019a). However, this existing work, our own included, has tended to conceptually blur the what and the how of intermediation by, for instance, providing activity or role lists that imply both what is being mediated and the types of actions involved in mediation. Notwithstanding whether this blurring has resulted from an oversight or varying use of terms in different research traditions, our contribution in this article is to clarify the distinction between what is mediated and the modes by which this is done. Clearly only some, and not all, of the whats and the hows of intermediation (i.e., its modes) are coupled. For instance, various forms of technical meddling with equipment will take place by default through the intermediation mode we call *configuring*.

Our proposed framework outlines four distinct modes of intermediation. By *brokering*, intermediaries engage through building connections between different actors and resources and introducing new actors in sustainability initiatives. By *configuring,* intermediaries alter technologies, materials, or social configurations, contributing in a concrete way to innovative solutions and practices. By *structural negotiating,* intermediaries influence regulation and policymaking, and the conventions and conceptions of incumbents, as well as open opportunities for new actors and ways of social and technical organizing. Lastly, by *facilitating and capacitating,* intermediaries create conditions and capacities that enable experimentation, learning, and expressing diverse views and concerns.

Our secondary contribution is made through the two empirical studies that illustrate how intermediation tasks and activities end up being pursued within different modes owing to the different competencies, remits, resources, positions, and networks of the intermediaries (cf. Hodson and Marvin, 2010; Mignon and Kanda, 2018; Hyysalo et al., 2022). The modes then affect what the intermediaries are capable of accomplishing in their efforts to mediate. The interests and identities of intermediaries and the backgrounds from which they emerge can also affect how they select or prioritize only some modes of intermediation, even if the need for other modes is just as evident (cf. Glaa and Mignon, 2020; Hyysalo et al., 2022; Smith et al., 2016). Both studies also demonstrate the complementarity of the modes and the need to simultaneously pursue several modes in order to accomplish intermediation.

Thirdly, the analysis of the modes contributes to the understanding of what it takes to effectively pursue intermediation under the different modes. Thus, the ability to distinguish and assess the modes of intermediation is not only conceptually relevant but very much also relevant in practice. In efforts to set up and coax intermediaries to advance sustainability transitions, it is vital to assess not only what intermediation is needed but also what competencies, resources, remits, and affiliations the intermediaries need in order to perform the tasks and modes that are expected of them (cf. Glaa and Mignon, 2020; Kivimaa et al., 2019a; Mignon and Kanda, 2018). The case of intermediation in the use of vacant spaces highlights that architects, as intermediaries, hold command in configuring the spaces in new ways, making their new uses amenable to local bottom-up actors and real-estate owners. In contrast, real-estate agents intermediating in the same issues with the same actors could not similarly reconfigure spaces, but they could be more versed in the contract issues involved in structural negotiating. In turn, the case of renewables demonstrated that user intermediaries could effectively pursue brokering between the suppliers and adopters of low-carbon technologies in the absence of such brokering being done by public energy-efficiency counseling agencies. Yet, the user intermediaries tend to fall short in structural negotiating for regulatory changes and towards incumbent actors. As is evident from both studies, access to the right networks and actors (i.e., getting a seat at the table) is also paramount for engaging in structural negotiating (Hernberg, 2021). Furthermore, we recognized that all modes of intermediation tend to involve various non-human entities such as instrumentations and media (cf. Contesse et al., 2021), but the *configuring* mode, in particular, tends to require special tools, media, or platforms.

These examples show that *the modes matter* in assessing what is required for intermediation and, in turn, how effective individual intermediaries and ecologies of intermediation are for a given area of local experimentation. Assessing the modes of intermediation shows de facto structural gaps in the intermediaries' ability to perform their tasks and not just structural gaps in what is being intermediated (Hyysalo et al., 2018; Hyysalo et al., 2022; Soberón et al., 2022). The need for such assessment of modes and the related factors affecting intermediaries' capability to pursue intermediation is particularly salient when ecologies of intermediation are

dynamically changing in the course of sociotechnical change. Not only what and between whom the intermediation happens can change (Kivimaa et al., 2019b; Hyysalo et al., 2022), once-effective modes of intermediation can become *outmoded*. In the case of hybrid renewables in Finland, the markets and associated ecologies of intermediation for particular low-carbon solutions (such as heat pumps, solar photovoltaics, and wood-burning stoves) had already become quite well intermediated by industry and public-sector actors but became re-complicated by the rising numbers and varieties of additive and combinatory hybrid low-carbon arrangements (Hyysalo et al., 2022; Murto et al., 2020), resulting in renewed needs for users to intermediate among themselves.

The empirical studies lead us to conjecture that in local experimentation in the built environment, facilitating and capacitating, and brokering are the intermediation modes that tend to be the easiest to recognize and to assess to be missing. These may also be relatively more generic modes in which most intermediary actors can engage to at least some degree. In contrast, the structural negotiating and configuring modes of intermediation require more domain-specific knowledge and skills. The configuring mode almost always requires a combination of technical skills and an understanding of the situated contexts of use of the bottom-up actors. The successful structural negotiating of intermediaries, in turn, requires an in-depth understanding of regulatory and incumbent actors' logic, business models, contract types, et cetera. It is thus rare to find intermediaries that are capable of pursuing all these modes competently.

The recognition of the interrelatedness of intermediary resources, positioning, remits, skills, and the effective performance of different modes highlights the relevance of the modes for setting up intermediaries, planning their procurement, or providing support measures in order for intermediaries to function effectively. Previous research suggests that modes (such as structural negotiating) aiming at more systemic impact particularly require financial stability and longevity (Hodson and Marvin, 2010). In turn, inadequate or short-term resourcing may lead to the constant need for intermediaries to negotiate their legitimacy and seek funding to ensure their survival (Hodson and Marvin, 2010; van Veelen, 2020).

Finally, there are some limitations to the research that also point toward further research needs. The scope of transition contexts and phases, and the types of intermediation included in the two empirical studies are limited. The proposed framework of modes provides ground for further studies on the intermediation of local experimentation as well as for analyzing intermediation in new transition contexts and new intermediation types that also involve broader ecologies of intermediation. Analysis of intermediation modes should also be linked to how external conditions shape intermediation and how intermediaries themselves shape and negotiate those conditions (see Hyysalo et al., 2022; van Veelen, 2020; Hodson and Marvin, 2010).

In sum, the intermediation modes articulated in this paper are highly relevant, not only conceptually and analytically but also in practice. For municipalities and other actors aiming to advance socio-ecological sustainability through local experimentation, the modes matter in terms of understanding what it takes for intermediation to be effective and, consequently, what support mechanisms need to be provided for it.

CRediT authorship contribution statement

Hella Hernberg: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Sampsa Hyysalo:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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