



# Socially innovative experiments for transformative local development: Putting more-than-growth-oriented local interventions in spatial context

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## ABSTRACT

Experimentation is key for accelerating local transformations. Experimentation discourse, however, is often biased towards technology. We introduce the notion of socially innovative experiments (SIX) and their contribution to transformative local development as a counterbalance. We conceptualize SIX in local development and study over 100 SIX in Austria in terms of spatial context and their interactions with space. Results show that (1) SIX with a place-based approach are more likely to spark change than unbound interventions, (2) rural SIX face more barriers while at the same time being more substantial for successful local transformations, and (3) thorough spatial embedding is thus key for ensuring SIX' contribution to local transformations. We hence advocate for local caretakers and transformation hubs to oversee local challenges, promote exchange and learning between experiments, and take on the patronage of SIX for transformative local development.

## 1. Introduction

In the face of the climate crisis and an array of sustainability issues, the governance of local development has become a task defined by both urgency and uncertainty (Roggema, 2016; Marchau et al., 2019). In this context, experimentation has proven to be a promising approach for an accelerated transformation by employing a learning-by-doing attitude (Evans et al., 2016; Turnheim et al., 2018). By testing ideas in real social settings, their practicability and impact can be observed, learning and iterative improvements can be done “on the fly”, and promising paths for change can thus be sounded out (Hildén et al., 2017). Experimentation has countless forms, ranging from product innovation trials that optimize sociotechnical infrastructures to critical grassroots innovations that implement alternative practices and lifestyles to challenge exclusivity and unsustainability (Seyfang and Smith, 2007). Due to their limited duration, they can also be bolder and more drastic than formalized governance procedures would normally allow and test critical or even radical “what if” scenarios of transformative change (Neuens et al., 2013).

Not least for this reason, experimentation is accorded particular importance when it comes to pursuing a transformative notion of local development that encompasses more than economic growth. In recognition of planetary boundaries, such conventional growth objectives can no longer be pursued (Raworth, 2012; Steffen et al., 2015). The local ripple effects of the pandemic, and the financial and climate crisis have also made strikingly clear that urban and regional development must be boldly reinterpreted to incorporate resilience and inclusion as key objectives (Martin et al., 2022). Such perspectives look at markets and infrastructures as physical and social provisioning systems geared toward satisfaction of basic human needs and well-being instead of growth and rent extraction (Fanning et al., 2020).

In this line of thinking, social innovation has gained major significance as a lever of transformative local development (Moulaert et al., 2015; Wittmayer et al., 2020). Social innovations are community-based, inclusive and socially sustainable solutions catering to concrete social needs (Wittmayer et al. 2020; Daniel and Jenner 2022; Moulaert et al., 2023). They can change social processes, policy and planning by

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promoting new forms of decision-making and institutions, herewith enabling novel perspectives on familiar issues (Haxeltine et al., 2017; Sovacool et al., 2023). They can also result in sustainable business models for inclusive economies and just transitions, promoting a social economy and social entrepreneurship, herewith bridging social and economic development aspects (Mulgan et al., 2007; Murray et al., 2010; Lisetchi and Brancu, 2014).

This paper combines these perspectives in the concept of socially innovative experiments (henceforth: SIX), discussing their role for transformative local development. We look at how SIX address locally specific challenges of transformation, the social change they aim for, the obstacles they typically come across, and the tangible changes they achieve, and how these aspects differ in urban and rural contexts. In doing so, we pick up the criticism of experimentation discourse being biased towards technology (Levenda, 2019), adding a dedicated perspective on non-technological experiments, such as new forms of community engagement, urban regeneration, or social business and how they differ in specific spatial settings. Herewith, we show how SIX can contribute to more-than-growth-oriented local development, while emphasizing how space matters in this regard, and what kind of support SIX in respective contexts need.

We begin by introducing our takes on experimentation and social innovation for transformative change, and what makes SIX stand out in that regard in Section 2. In Section 3, we conceptualize the SIX process in local development and why an urban-rural differentiation can be a valuable lens. In Section 4, we apply these aspects to the study of 116 SIX in Austria, discuss our findings in Section 5, and point to key issues associated with facilitating future experiments for transformative local development in Section 6.

## 2. Experimentation & social innovation – trialing social change?

### 2.1. Experimentation – lever for transformative change

Experimental practices gained attention recently for promising new ways of trialing change and designing transformations (Evans et al., 2016; Huitema et al., 2018). In times of “super-wicked problems” (Levin et al. 2012), “deep uncertainties” (Marchau et al. 2019), and indeterminacy (Bulkeley, 2023), the experiment provides room for adaptive capacity in governance and planning that is crucial to break up rigid structures and enable learning with speed, scale and impact for deep-seated transformations. The transformative potential of experiments lies in their ability to put established unsustainable configurations into question and fast-track their de-institutionalization by circumventing rigid, incremental policy approaches (Fünfschilling, 2019; Wanner et al., 2021). From alternative mobility schemes (cf. Leroy et al., 2023) to various adaptation and mitigation actions (cf. Castán Broto and Bulkeley, 2013) – by testing potential solutions for various climate and sustainability issues, experiments instigate purposeful, sometimes drastic change to move from an undesired status quo to a new and desired state (Hoelscher et al., 2018). As a practice-oriented form of governance intervention, experiments react to and interact with challenges of local development (Sengers et al., 2019), hence providing place-based solutions to issues of global magnitude (Eneqvist and Karvonen, 2021).

The vast body of experimentation literature unveils four readings of experimental practices (cf. Table 1): First, in transformative research, experimentation constitutes a central, action-research-inspired method for co-creating products, services, and other potential solutions for climate and sustainability issues, and generating transformative knowledge with a variety of actors (Schäpke et al., 2017; Steen and van Bueren, 2017; McCrory et al., 2020). Second, in sustainability transitions, experiments are thought of as key approaches at the early stages of innovation processes and for niche creation in specific socio-technical systems such as energy or mobility (Geels and Schot, 2007; Boyd and Juhola, 2015). Third, in governance research, experimental

governance denotes a new, almost paradigmatic approach of ad hoc putting novel ideas for policies and instruments into practice to observe policy effects in real life and direct change accordingly (Anguelovski and Carmin, 2011; Tassey, 2014; Morgan, 2018). And fourth, grassroots innovations are singled out as a unique form of bottom-up or activist experiments that test alternative practices and ways of living to challenge unsustainable or unjust modes of production, consumption, and living (Seyfang and Smith, 2007; Sengers et al., 2019).

Despite that, the reception of experimentation is still by and large one of testing technology (Levenda, 2019). Experiments prioritizing social innovation often remain a side issue in local policy and practice. They are also under-researched in terms of their spatial context and embedding (Suitner and Krisch, 2023), and their potential effects (Rogge and Stadler, 2023). For realizing societal transformation, just transitions, and wider acceptance of change, social innovations are however essential. They emphasize innovative ideas and implementation processes emerging from specific structural and sociopolitical contexts and address local social needs, co-creating and consolidating knowledge through changed social practices and interactions for transformative change (Moulaert et al., 2015; Wittmayer et al. 2020). Hence, we argue that experiments focusing on social innovation are indispensable ingredients for transformative local development, particularly if we acknowledge a more-than-growth oriented development perspective. This hence requires clarification of the concept of social innovation.

### 2.2. Social innovation for transformation

In principle, social innovation describes purposeful social change, i.e., the deliberate alteration of those variables that make up the structure of society and social processes (Domanski et al. 2020; Moulaert et al., 2023; Havas et al., 2023). Social innovation can, for example, change established social practices, inherited modes of interaction and cooperation, or certain organizational forms (Domanski et al., 2020; Sovacool et al., 2023). It responds to a concrete unsatisfactory condition (e.g., lack of access to housing for certain social groups, or inefficient organization of decision-making mechanisms) and attempts to improve it by reshaping social configurations and practices (van Wijk et al., 2019). Consequently, access to important resources can be redistributed, social processes can be organized more effectively, political and economic participation can be ensured, and commitment and acceptance for change can be increased (Avelino et al., 2019).

In the context of transformative change, the concept of social innovation has thus gained attention. From a research perspective, it offers a valuable lens to explore the interplay between changes in established systems and the transformation of social practices (Moulaert et al., 2015; Castro-Arce and Vancley, 2020; Wittmayer et al., 2020). In policy and practice, social innovation is considered a key element of enabling transformative local development, as it can bolster a social economy, ensure inclusive decisions and engaged communities, and bring about alterations in established institutional arrangements (MacCallum et al., 2009). The latter also sets it apart from traditional (technological) approaches to innovation, as it places emphasis on the integration of societal practices within spatial, political, economic, cultural, and legal contexts (Howaldt and Kopp, 2012; Marques et al., 2018; Pel et al., 2020).

This understanding points us towards the centrality of social innovation for societal transformations, as it involves the alteration of those lifestyles, social and business practices, and local policies that are considered unsustainable and, thus, not “future-proof”. Changing social relations, institutional arrangements and actor configurations is not only meaningful from a social practice perspective, but is of political significance, too, as it intervenes in the sphere of resource allocation and resource accessibility, power relations, perceptions and understandings (Moulaert et al., 2023). Analytically, the social innovation lens allows capturing place-based approaches to transformative

**Table 1**

Four readings of experimental approaches (authors' elaboration).

Field/line of discourse	Prevailing conception of experimentation	Key actors in experiments	Main objective of experimentation	Key literature
Transformation Research	Research method for knowledge, product, or service co-creation	Researchers	Learning, generating actionable knowledge	Schäpke et al., 2017; Steen and van Bueren, 2017; McCrory et al., 2020
Transition Studies	Key part of innovation or niche creation in socio-technical systems	Entrepreneurs	System optimization and modernization, sustainable innovation	Geels and Schot, 2007; Boyd and Juhola, 2015; Sengers et al., 2019
Governance Research	Governance tool to shortcut incremental change & policy cycles	Policy- & de-cision-makers	Effective governance, accelerated impact	Anguelovski and Carmin, 2011; Tassey, 2014; Morgan, 2018
Social Change	Counter-hegemonic social practices & ways of living	Civil society actors, activists	Autonomy, well-being, social criticism	Seyfang and Smith, 2007; Sengers et al., 2019

development from problem recognition and ideation to implementation and consequential structural and institutional change (Suitner et al., 2023).

### 2.3. Towards socially innovative experiments

As described above, social innovation is essential for transformative development. It is an important, yet so far insufficiently considered complement to the technoeconomic development perspective. Simultaneously, experimentation has gained prominence as a potential hopeful of accelerating transformation in contexts of scarcity, uncertainty, and crisis. We integrate these two views in the concept of socially innovative experiments.

We argue that SIX are inherently place-based, as these types of intervention typically emerge in reaction to specific challenges and their local societal implications (Eneqvist and Karvonen, 2021). They aim at satisfying basic human needs through provisioning systems without exceeding planetary boundaries, thus combining ecological with social goals (Webb et al., 2023). Hence, they have great potential to achieve transformative change on the local level, particularly by creating tailored solutions through community engagement, cooperation and learning from lived experience (ibid.). SIX are thus essential for exploring potential transformation pathways and supporting local development in a more-than-growth perspective.

SIX manifest in different ways, inspired by a multitude of scientific, political, civic, or entrepreneurial approaches and the respective challenges they aim to address (Sengers et al., 2019). Hence, they can involve a plethora of interventions from the testing of novel, inclusive business models to unconventional urban regeneration approaches or new modes of community engagement (Rogge and Stadler, 2023). In

such a reading, SIX can ensure social justice and equity alongside economic and environmental outcomes through addressing interdependent and challenging issues at different levels – from local to global – enabling socio-economic and institutional redesign (Webb et al., 2023).

To better facilitate their design and implementation from a local and regional development perspective, it is important to get a clear understanding of the emergence, implementation, and outcome of SIX in their spatial context. With our study, we aim to provide such a perspective. The following section conceptualizes the SIX process in local development.

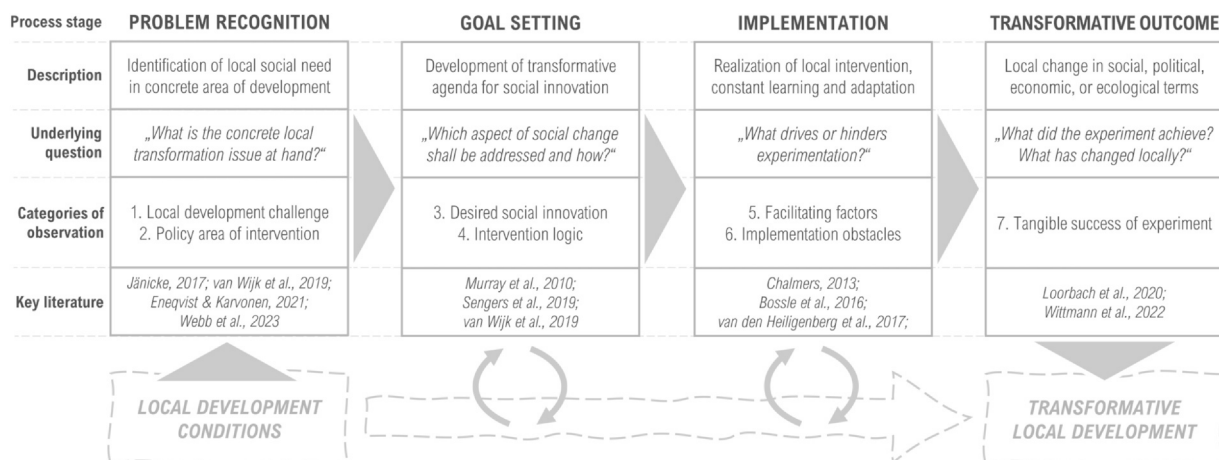
## 3. Putting SIX in spatial context

### 3.1. Conceptualizing SIX in local development

In this paper, we set out to better understand how SIX can contribute to transformative local development. Therefore, it is imperative to comprehend how they interact with local development conditions. We conceptualize this interaction along the different stages of the experimentation process (Suitner, 2021), with different aspects of interaction becoming relevant throughout the process. The resulting four-stage conception points to concrete categories of observation at specific stages that build the foundation for the subsequent empirical study and indicate points of reference for the necessary information to investigate SIX in other contexts and support them in practice respectively (cf. Fig. 1).

#### 3.1.1. Problem recognition

Our conceptualization begins with problem recognition. The literature states that social innovation always responds to concrete social



**Fig. 1.** Conceptualizing the four-stage process of socially innovative experiments in local development (authors' elaboration).

needs (Bock, 2015; Castro-Acre and Vanclay, 2020), while urban experimentation discourse explains that interventions typically emerge from and constantly interact with place (Eneqvist and Karvonen, 2021; Evans et al., 2021; Schreuder and Horlings, 2022; Jeannerat and Crevoisier, 2022). Hence, in our concept, too, SIX emerge from the unique local development conditions of a specific locale and the identification of a concrete (eco-)social issue in a specific area of local development (e.g., lacking participation in local climate policy, or unsustainable regional energy systems). The related development challenges hence constitute one area of observation. Depending on local specifics, they can involve several problem areas, ranging from inequality and exclusion, lacking knowledge, education and awareness to affordability and sustainability issues of different kind, environmental threats, and climate adaptation and mitigation concerns (Marques et al., 2018). These challenges are always linked to concrete policy areas, in which experiments ultimately intervene. Following Jänicke (2017), we distinguish eight policy areas: agriculture & food, construction & housing, economy, energy, land-use & environment, mobility, politics & governance, and social affairs.

### 3.1.2. Goal setting

Transformative local development involves a reinterpretation of infrastructures as provisioning systems. SIX can significantly contribute to this notion by promoting the social dimension of transformation. It is therefore important to examine how SIX aim to address this. In our conceptualization, this constitutes the second stage: goal setting. It builds on the prior problematization of local development challenges and the associated social needs in certain policy areas. It usually includes considerations about the desired social innovation as well as the conception and preparation of the actual intervention. It can be assumed that structural conditions and the local availability of certain resources play a key role in the design of the intervention (Wamsler et al., 2013; Suitner and Krisch, 2023), constituting another instance of interaction with spatial context. Following the literature, we distinguish four types of social innovations (Marques et al., 2018; Domanski et al., 2020; Pel et al., 2020):

- Changing practices and forms of interaction, e.g., new production and consumption modes, or new forms of civic or entrepreneurial (self-)organization,
- Enabling or reconfiguring resource access, e.g., access to information and education, or affordable housing, sustainable food, energy, or similar,
- Developing new, inclusive business models, e.g., local sharing initiatives or citizen power plants, and,
- Introducing new forms of inclusive political participation, governance arrangements and decision-making, e.g., citizen councils or co-creative urban regeneration actions.

Regarding the type of intervention, the boundaries between ideal-type experiments as defined in theory are often blurred (Raven et al., 2019). Nevertheless, it can be instructive to distinguish between interventions that follow a scientific, activist, or other logic and to observe whether they correlate with spatial context. We therefore draw on our theoretical differentiation above and distinguish between four logics of experimentation as a basic categorization: transformative research, transition experiments, governance experiments, and grassroots innovations.

### 3.1.3. Implementation

Following the logic of innovation studies, the successful implementation of experiments depends on certain innovation drivers and obstacles (Bossle et al., 2016; Hervas-Oliver et al., 2021). Many of these factors are a direct expression of local structural, socio-economic and political conditions. Thus, a spatially differentiated view is also worthwhile here in order to recognize certain patterns. Earlier studies

already pointed out that experiments need suitable “habitats” that dispose of conducive conditions (van den Heiligenberg et al., 2017). Ties and networks (Ansell and Bartenberger, 2016; Fuenfschilling et al., 2019), organizational support (Eneqvist and Karvonen, 2021), on-going scientific consultation (Wanner et al., 2018), and financial funding (cf. Kronsell and Mukhtar-Landgren, 2018; Eneqvist and Karvonen, 2021) are among the most well-known facilitating factors of experimentation. On the other hand, structural barriers, path-dependencies, and powerful interests often present hurdles to an accelerated transformation (Wittmayer et al., 2020; Hertrich and Brenner, 2023), with shortage of resources, poor design of interventions, vested interests, and rigid (or lacking) policies being some of the most prominent barriers to experimentation (Chalmers, 2013; van den Heiligenberg et al., 2017). Many of these factors typically arise from a specific local context. A spatially differentiated perspective therefore also seems sensible in this respect.

### 3.1.4. Transformative outcome

The literature often cites learning as the main objective of experimentation (Moulaert et al., 2015; Sengers et al., 2019). At the same time, many experimental initiatives aim to bring about immediate change locally, particularly those oriented at social needs (Loorbach et al., 2020). The fourth and final stage of the SIX process hence asks, what the experiment has achieved and to what extent its outcome contributes to transformative local development. “Outcome”, in this regard, refers to medium-term results that are directly linked to the goals of the SIX. Typical examples include a change in behavior, knowledge, policy, or practice, based on the reception and absorption of what was done during the experiment. In contrast, impacts are broader long-term effects that, however, have been enabled by these outcomes but are more extensive and far-reaching in that they extend beyond the immediate habitat of the experiment and have wider structural implications (Wittmann et al., 2022; UNDP, 2002). Tangible successes of SIX can be ascertained through detailed, case-specific impact analyses, but also ad hoc through direct consultation of experimentation implementers. Here, too, a spatial contextualization provides insights into the contribution of SIX to transformative local development under different conditions.

## 3.2. Differentiating urban and rural contexts of experimentation

Experimentation discourse typically focuses the city as stage, object, and actor of transformative action (Evans et al., 2016). Yet, the definition and analysis of experiments as necessarily urban is not always clear (Lovell et al., 2018), and the reading of experimentation as first and foremost urban hence begs the question of the relevance of non-urban space in transformations. A distinction between urban and rural contexts of experimentation thus seems reasonable, as climate and sustainability problems often pose very specific local challenges of transformation in rural or peripheral regions that decidedly urban experiments might not be able to sufficiently address. Blinding out those spatial differences that might have given rise to certain experimental interventions in the first place might hence lead to transformative failure. We assume that the appreciation of and interaction with specific spatial conditions in developing suitable solutions factors well into the design and implementation of experiments in respective urban or rural settings (Wamsler et al., 2013). Although we take criticisms of simplistic urban-rural dichotomizations seriously, we argue that in spatial development contexts such categorical distinction still often informs how actors think and act (de Olde and Oosterlynck, 2022), and how experiments are hence being devised.

The literature on social innovation has also long argued for a differentiation between the particularities of urban and rural development patterns (Moulaert et al., 2005; Bock, 2015). The fragility of supportive ecosystems in rural regions is exacerbated by phenomena such as brain drain and rural-urban migration (Copus, 2013). However, recent studies have shown how social innovations gain traction in rural



## Socially innovative experiments in Austria

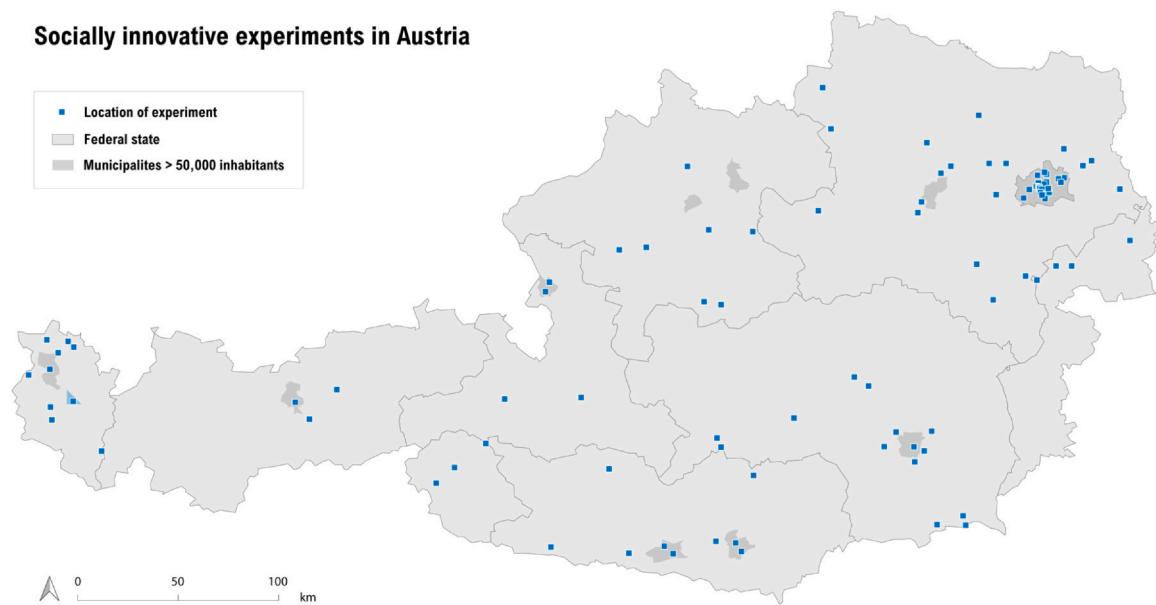


Fig. 2. Mapping SIX in Austria: Location of experiments (Layout: Aigner and Suitner).

environments through re-establishing social relationships and building up social capital for change through their networked character, here-with also bringing in knowledge from outside the region (Stoustrup, 2022; Schermer and Kroismayer, 2020). The urban-rural differentiation hence constitutes a first useful iteration of empirically putting SIX in spatial context and that way better understanding their functioning in different local geographies. Based on these considerations and the above conceptualization, we comprehensively surveyed SIX in Austria and analyzed the results in terms of urban-rural differences for each process stage. The methodology and results are presented in the following section.

### 4. Grasping SIX in Austria: Putting more-than-growth-oriented local interventions in spatial context

In Austria, too, debates on the contribution of SIX to transformative local development are intensifying (cf. Suitner et al., 2022; Thaler and Penning-Rowsell, 2023). Yet, there is hardly any well-founded or structured knowledge about the range of SIX, let alone their interaction with specific spatial configurations. This complicates their facilitation in local development. To remedy this, we conducted an exploratory survey on SIX in Austria according to the above categories of observation. The data collected provides the first ever comprehensive overview to the diversity of SIX and their interaction with specific urban and rural contexts in Austria.

#### 4.1. Methodology

To obtain information about SIX in Austria, we aimed for representatives of these experiments to complete an online survey with questions along our conceptualization. For this purpose, we first conducted a screening of 59 online databases and a total of over 1200 experiments from December 2021 to February 2022 to invite only those initiatives that fit our set of selection criteria. Those were as follows:

- A clear focus on transformative change, climate change and/or sustainability issues is evident.
- The experiment or a central element of the intervention has an innovative character, i.e., is new to the respective context and not yet well-established in Austrian transformative governance.
- The socially innovative element is clearly recognizable and social change is a goal.

- The experiment is (or was) implemented in Austria.
- Implementation has started between 2010 and 2022.

The so-created database included 218 SIX that were invited to participate in the survey between March and May of 2022. The questionnaire was implemented with LimeSurvey. It aimed at retrieving (1) general information, such as inception, duration, and location of the intervention, (2) key characteristics, particularly the key challenges, objectives and policy areas addressed, and key actors involved, as well as (3) assessments of drivers and barriers of implementation, and experimentation outcomes. Overall, 116 SIX completed the survey (completion rate: 53,2%).

In a first step, we grouped the information queried along the four process stages of our above concept and differentiated between urban and rural spatial context of SIX. Therefore, we merged the sample experiments' locational data with the EU Degree of Urbanisation typology ["DEGURBA"] (Eurostat, 2022). For reasons of comparability and replicability it was important for us to use an existing, recognized spatial typology that is both robust and simple, while differentiating spatial units on a comparably small scale. Distinguishing urban from intermediate and rural areas on municipal level based on 2011 population grid data, DEGURBA met these criteria.

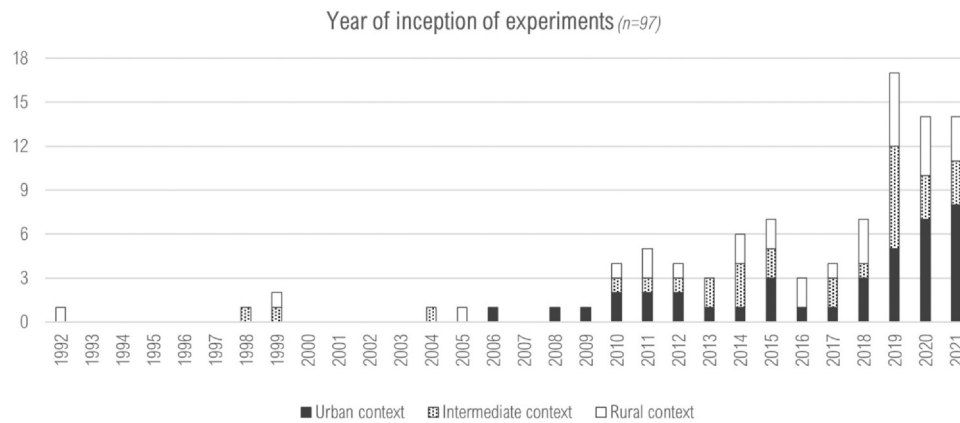
#### 4.2. Results

The sample reveals a wide range of interventions. All policy areas, all types of social innovation and all intervention logics from the above concept are represented. SIX range from local energy communities and food coops to municipal citizen councils and unconventional place-making interventions, from co-creative research endeavors to nudging experiments and grassroots co-housing initiatives. Cases are equally distributed across all parts of Austria, as Fig. 2 shows. The sample incorporates SIX from all 9 Austrian federal states, spanning the whole spectrum of urban core areas and rural or peripheralized regions.

Merging the survey sample's locational data with the DEGURBA typology illustrates the balance of the sample (cf. Table 2). 39 SIX were implemented in urban contexts (category 1), 29 in towns and suburbs (category 2), and 29 in rural areas (category 3). 19 experiments have no clear spatial reference and thus had to be removed from the sample for the analysis. Overall, the three groups represent a similar range of interventions. However, results reveal noteworthy differences when differentiating by spatial context.

**Table 2**  
Location of SIX according to EU Degree of Urbanisation typology [DEGURBA].

DEGURBA category	DEGURBA Description	No. of SIX in sample
1	Densely populated area: Cities, urban centers, urban areas	39 (34%)
2	Intermediate density areas: Towns and suburbs	29 (25%)
3	Thinly populated areas: Rural area	29 (25%)
n.a.	Experiments with no clear spatial reference ( <i>excluded from analysis</i> )	19 (16%)



**Fig. 3.** Year of inception of SIX differentiated by DEGURBA spatial context (authors' illustration).

As an overview, Fig. 3 illustrates the year of inception of SIX in the sample, unveiling a significant increase since 2018 that indicates their growing relevance for local development.<sup>4</sup> The constant annual increase of experiments in urban contexts in recent years is particularly striking and is largely responsible for the general trend. However, pioneering interventions that emerged already in the 1990s and early 2000s are located solely in non-urban areas. While they might not have been termed experiments then, they surely match the attributes associated with our notion of SIX. The results for a spatially differentiated analysis by process stage are presented below.

#### 4.2.1. Stage 1: Problem recognition

As explained above, the first step of experimentation is recognizing a concrete transformation issue that is connected with the respective local development conditions. Survey participants were hence asked to indicate the addressed challenges and primary policy areas of their interventions. Concerning primary policy area, SIX in energy dominate in rural areas with almost a third of all interventions, with a clearly decreasing relevance in intermediate and urban contexts. Mobility experiments account for a significant proportion of interventions in intermediate areas (just under 25%), whereas in other spatial contexts they only appear sporadically. SIX focusing on land-use & environment, on the other hand, account for a significant share in urban areas, while they hardly play a role in non-urban contexts (cf. Fig. 4). For SIX in other policy areas, there are no relevant differences regarding spatial context. Concerning challenges, the transition towards more sustainable infrastructures and climate change mitigation are by far the two most important challenges tackled by SIX in the sample (cf. Fig. 5). The establishment of sustainable infrastructures is apparently primarily a driver of experimentation in urban areas, with decreasing relevance in rural contexts. An opposite trend can be observed in climate change mitigation. Protecting the climate is a central motive for experimentation in rural areas, with decreasing relevance in urban areas. It is

<sup>4</sup> Some participants interpreted the origin of their initiative differently and therefore located the kick-off far in the past, before the start of the defined study period. This, however, only points to the sometimes lengthy step from initial idea to implementation.

also interesting to note that affordability issues, education and awareness are very important in rural contexts, while participation and inclusion in transformation activities appear to be more important in urban contexts. Lastly, climate adaptation-oriented interventions stand out, as these are located almost exclusively in urban areas.

#### 4.2.2. Stage 2: Goal setting

In terms of goal setting, we asked each SIX about the social innovation they were aiming for and the intervention logic to achieve this change. As explained above, these considerations are also influenced by the respective local context and thus potentially allow for conclusions regarding specific transformation issues in different types of regions. In terms of intervention logic, grassroots innovations are most prominent (38% overall), followed by transition experiments (29%), transformative research endeavors (24%), and governance experiments (9%). Research interventions are slightly more common in urban contexts, whereas transition experiments are more relevant in rural areas. As concerns the desired social innovation, SIX in urban contexts are primarily aimed at changing resource access (46%). More than one in four also want to test and establish new business models with their intervention. SIX in rural areas (41%) and in intermediate contexts (34%), on the other hand, primarily aim at changing established practices, forms of interaction and organization in specific fields of action. Testing new, inclusive business models is similarly important here (rural: 34%; intermediate: 31%) (cf. Fig. 6).

#### 4.2.3. Stage 3: Implementation

To see what spurred or thwarted SIX in practice, we also queried implementation drivers and obstacles. We posed open-ended questions to not exclude statements with prescribed answers and consequently built categories inductively. The following five key drivers could be identified:

- Knowledge of place, i.e., of a development trajectory or specific local transformation challenges,
- personal networks, e.g., ties with other local actors that were key for the experiment's realization,
- financial funding, mostly through different public funding programmes,

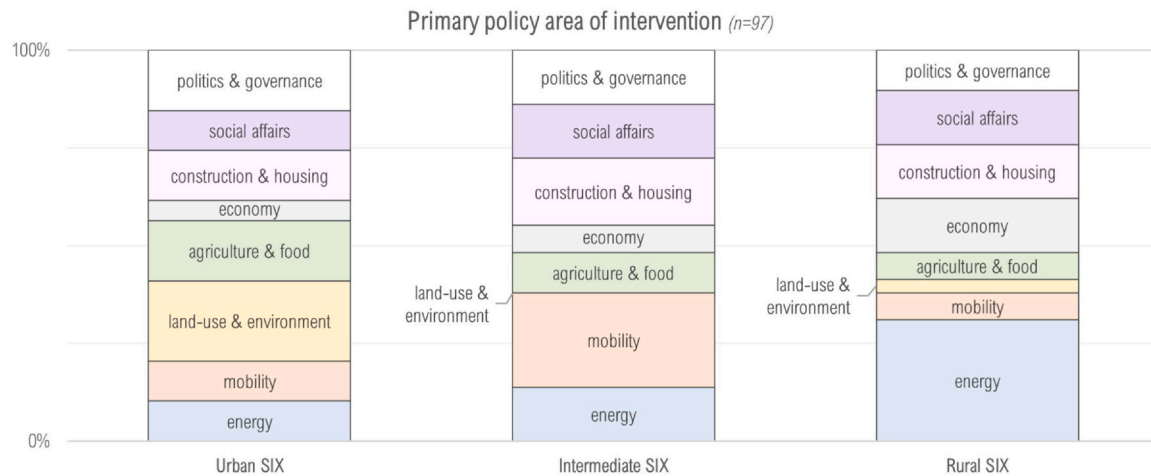


Fig. 4. Primary policy area of intervention differentiated by DEGURBA spatial context (authors' illustration).

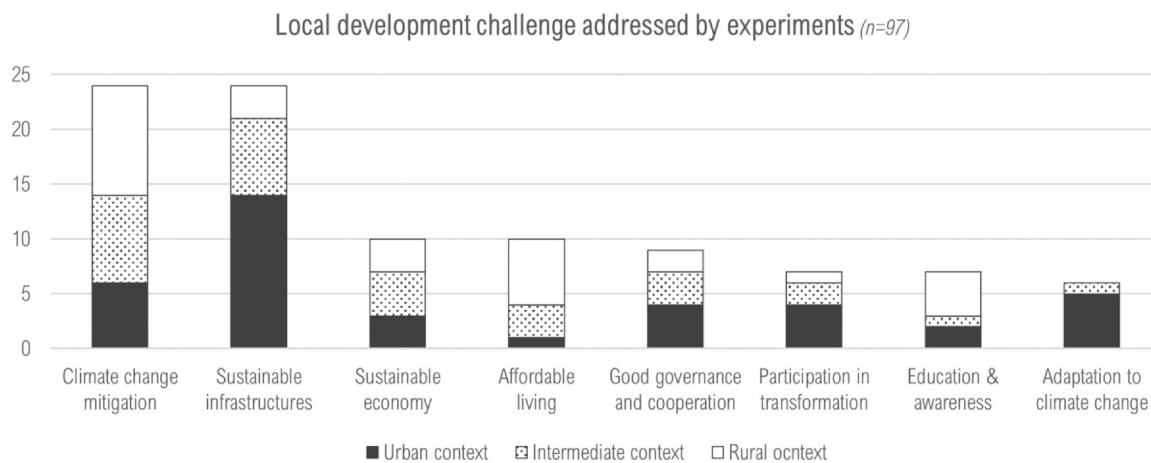


Fig. 5. Key local development challenges addressed, differentiated by DEGURBA (authors' illustration).

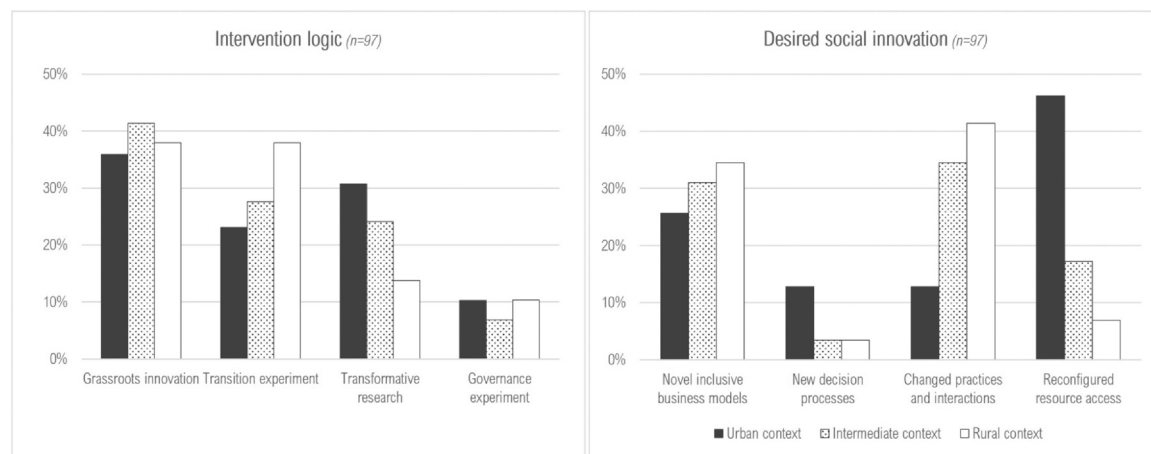


Fig. 6. Intervention logic and desired social innovation of SIX, differentiated by DEGURBA (authors' illustration).

- organizational support, such as local public administration providing venues and legal advice, and
- scientific support, e.g., for the design of the intervention, co-creation or dissemination formats.

In general, the relevance of drivers is assessed similarly across all types of regions, although SIX in decidedly urban and rural contexts attach slightly more importance to innovation drivers overall than SIX in intermediate areas. Local knowledge and networks are the two most

important facilitating factors, which points to the place-attachment of SIX (Marques et al., 2018), whereas financial, organizational, and scientific support have less relevance for successful implementation (cf. Figs. 7 and 8).

In the same manner, five obstacles could be distilled from participants' statements:

- Shortage: Limited funding and/or duration of the intervention curtailed its success

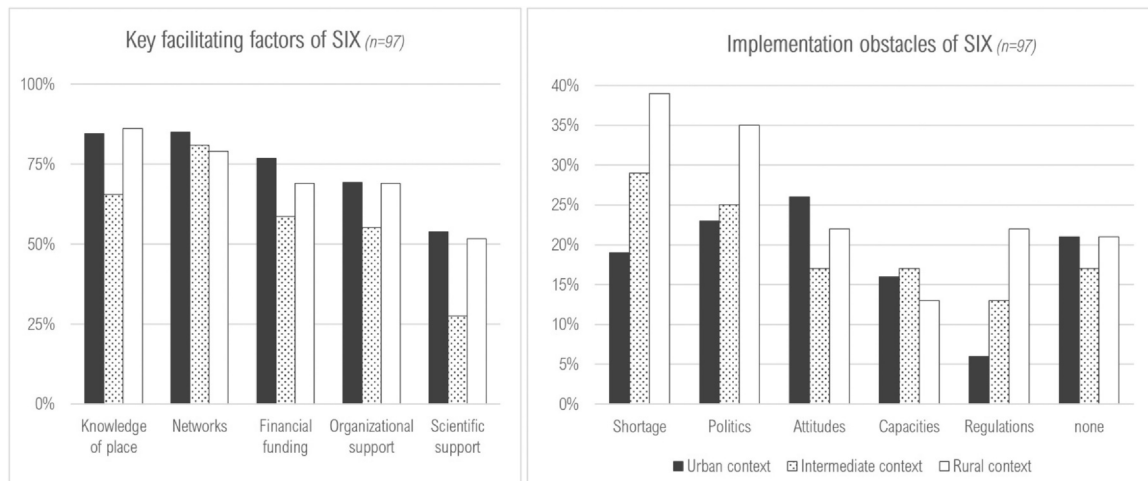


Fig. 7. Key drivers and barriers of implementation of SIX, differentiated by spatial context (authors' illustration).

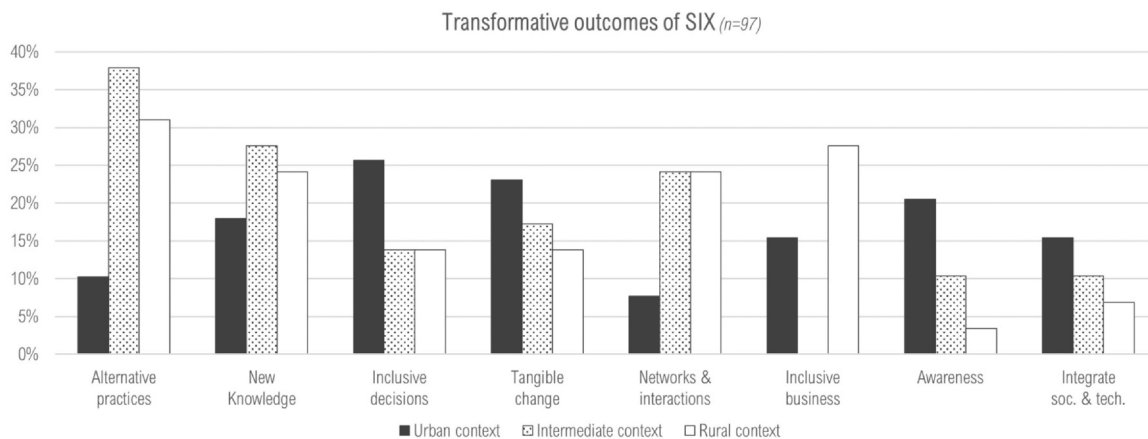


Fig. 8. Assessment of transformative outcomes, differentiated by spatial context (authors' illustration).

- Politics: Lack of political backing, political influence or instrumentalization, change of decision-makers or agendas negatively influenced intervention
- Attitudes: Experimentation actors failed in conveying the relevance of their intervention, motivating a critical mass of participants, or suffered from critical attitudes towards change
- Capacities: Implementers suffered from excessive demands, lack of time resources, or individual conflict
- Regulations: Legal frameworks or (changing) market conditions were unfavorable at the time of implementation

These barriers clearly vary between spatial contexts. Only one in five SIX indicated that they didn't face any obstacles. Overall, SIX in more rural contexts appear to be significantly more fragile. Time and budget constraints are much more serious, they face more political influence or opposition, and existing regulations, such as specific legal constraints also pose a more fundamental threat to successful implementation – aspects we will still discuss later.

#### 4.2.4. Stage 4: Transformative outcome

SIX are aimed at social change. That way, they can significantly contribute to local transformations, e.g., by initiating learning processes, producing new knowledge about how to shape local transformations, or achieving immediate change in specific systems and local structures. We asked, which changes SIX achieved according to their own assessment and derived the following eight types of outcomes, ranked by share of SIX indicating the respective outcome:

- Establish alternative practices of production and consumption (25%)
- Produce new knowledge for governing transformative development (23%)
- Set up new forms of inclusive decision-making & political participation (19%)
- Achieve tangible change through immediate local intervention (19%)
- Form new networks, interactions, and cooperation (18%)
- Enable knowledge transfer and raise awareness for transformation issues (14%)
- Establish new inclusive businesses or financial models (12%)
- Integrate social and technological innovation to enable change (11%)

The spatial contextualization also points to relevant differences here. Most strikingly, one in three non-urban SIX have realized new economic practices as compared to only one in ten urban SIX. Regarding the establishment of new networks, cooperation and interactions, a similar pattern occurs. In comparison, the successful implementation of new (participatory) political decision-making formats, the realization of immediate tangible change regarding local spatial configurations and awareness raising for transformation issues are more significant outcomes of experiments in decidedly urban settings.

## 5. Discussion

Our study shows that spatial conditions are highly influential for realizing desired social innovations. Sparking change is more likely for those experiments that take a place- and needs-based approach, are well



networked and embedded in existing institutional frameworks than those SIX pursuing unbound projects without consideration of local conditions. Embedding SIX in their specific spatial contexts at each of the four stages of the experimentation process is thus crucial for enabling deep-seated transformations. However, our data show that it makes no difference whether this context is more urban or more rural and thus supposedly more or less “innovation-friendly”. The testing of ideas for social change and societal transformation is not tied to specific types of places. Rather the understanding of their spatial embeddedness aids their success and transformative impact.

However, results also show that SIX in rural contexts are overall more fragile. They face significantly more time and budget constraints, political influence, and regulatory threats than SIX in urban contexts, making them precarious endeavors. At the same time, they are often more substantial for local infrastructure transformations, for instance, by aiming to establish new inclusive business models in and ownership of regional energy transitions that in urban contexts are often already well institutionalized and top-down orchestrated. Herewith, they add a vital social sustainability perspective to an otherwise predominantly technoeconomic local transformation process. Negative attitudes towards experimentation thus need to be addressed to normalize the unconventional nature of SIX in local development discourse as a key approach to local future-making in troubled times. Creating awareness for the value of such interventions in potentially creating transformative outcomes is key.

On another note, 43% of SIX were designed as open-ended interventions, meaning they had no end date set. This can be attributed to two circumstances: Either these initiatives have already become entrenched as new practices, governance mechanisms, or social enterprises. In that case, the step from experiment to institutionalized social change is fluid and the end of the experimental stage is difficult to pin down. Or the interventions aimed to create immediate impact and hence never intended to be temporary in the first place, which clearly distinguishes these SIX from commonplace conceptions of (technological) experiments. The ambiguity between SIX as ephemeral testbeds for change and permanent contributions to local provisioning systems is thus important to consider in terms of expectation management with such interventions and their role for local transformative development. In general, our study points to the need for a shift of emphasis from the general call for transformative change to its local implementation in path-dependent socio-spatial and socio-political settings. Rather than rolling out ubiquitous solutions, it is key to enable new practices and participatory decision processes that link these solutions with the social challenges of transformation in a specific locale and, that way, enable its tailored local embedding.

## 6. Conclusions: facilitating SIX for transformative local development

In this paper, we have integrated debates on experimentation and social innovation as two hopefuls for the governance of urban and regional development in contexts of scarcity, uncertainty, and crisis. We argued that socially innovative experiments (SIX) are an untapped potential for transformative local development, as they can ensure social justice and equity alongside economic and environmental outcomes. Our research shows that experimenting with new social practices not only enables transformative outcomes, but also has political significance. SIX are interventions that set out to change resource allocation and access, power relations, and perceptions of the challenges associated with local transformations. They allow exploring transformation pathways, enable socio-economic and institutional redesign, and thus hold political relevance for supporting local development in a more-than-growth perspective. A clear understanding of SIX is hence necessary for policymakers and practitioners at the local level.

Through our conceptualization of SIX we offer a more granular perspective on social innovation and experimentation and their dynamic interactions with local development. Differentiating the various

steps of the SIX process supports policymakers and practitioners in designing and supporting interventions more effectively. Differences between urban and rural SIX highlight the need for tailoring these interventions to their respective context. Policymakers can benefit from prioritizing the development of initiatives based on a thorough review of local needs that leverage local knowledge. In this sense, our research provides the evidence for regional policy actors to claim a clear mandate to act as knowledge and skills brokers, fostering intra- and inter-regional networks on different topics of relevance in urban and rural contexts.

SIX are important elements of an inclusive form of local governance that builds on various spheres of community, economy, and environment. They are crucial to engage civic, business, governance, and research actors to work towards social and institutional trust and enabling responsible development in their respective locale. To build trust and engagement, creating instruments of appreciation like local “honor badges” for engaging in SIX (as is widespread in Austrian voluntary work, e.g., in the fire sector) could be an interesting tool. In general, the variety of actors involved in transformative local development is crucially important to consider in policy design and implementation for facilitating SIX. This could translate into setting up local transformation hubs that bundle capacities for change and facilitate impact creation across sectoral and actor boundaries. Support mechanisms should prioritize citizens and the non-profit sector given that SIX often emerge as bottom-up, civic endeavors that need both financial and human resources for successful implementation. Citizen-initiated SIX would particularly benefit from organizational support by local administration, scientific support in process design and knowledge production, the introduction to relevant stakeholder and governance networks, and being familiarized with local development trajectories to reflect and assess their initial transformative aspirations vis-à-vis the places of experimentation.

This study achieved to conceptualize, contextualize, and overview the variety and potential contributions of SIX to transformative local development. Yet, it has certain limitations. We have emphasized the significance of specific spatial and political-institutional contexts and problematizations for the success of SIX. This also applies to the territorial context of our own study. Tendencies in problem recognition, goal setting, implementation, and impact, and the consequential policy recommendations might differ in political-institutional contexts other than Austria. Thus, similar studies in different territorial contexts could be valuable for better grasping “what works where” in terms of non-technological experiments as part of an agenda for transformative local development. Also, the descriptive perspective on the characteristics of SIX has left a blind spot on the specific approaches and processes of single interventions and how they interact with politics and place to create change and impact – a key question for future research on social innovation and experimentation for local transformations.

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## References

- Anguelovski, I., Carmin, J., 2011. Something borrowed, everything new: innovation and institutionalization in urban climate governance. *Curr. Opin. Environ. Sustain.* 3 (3), 169–175. <https://doi.org/10.1016/j.cosust.2010.12.017>
- Ansell, C.K., Bartenberger, M., 2016. Varieties of experimentalism. *Ecol. Econ.* 130, 64–73.
- Avelino, F., Wittmayer, J.M., Pel, B., Weaver, P., Dumitru, A., Haxeltine, A., et al., 2019. Transformative social innovation and (dis)empowerment. *Technol. Forecast. Soc. Change* 145, 195–206. <https://doi.org/10.1016/j.techfore.2017.05.002>
- Bock, B.B., 2015. Rural marginalisation and the role of social innovation. A turn towards nexogenous development and rural reconnection. *Sociol. Rural.* 56 (4), 552–573.

- Bossle, M.B., Dutra de Barcellos, M., Vieira, L.M., Sauvée, L., 2016. The drivers for adoption of eco-innovation. *J. Clean. Prod.* 113, 861–872. <https://doi.org/10.1016/j.jclepro.2015.11.033>
- Boyd, E., Juhola, S., 2015. Adaptive climate change governance for urban resilience. *Urban Stud.* 52 (7), 1234–1264.
- Bulkeley, H., 2023. The condition of urban climate experimentation. *Sustain. Sci. Pract. Policy* 19 (1), 2188726. <https://doi.org/10.1080/15487733.2023.2188726>
- Castán Broto, V., Bulkeley, H., 2013. A survey of urban climate change experiments in 100 cities. *Glob. Environ. Change* 23 (1), 92–102.
- Castro-Arce, K., Vancley, F., 2020. Transformative social innovation for sustainable rural development: an analytical framework to assist community-based initiatives. *J. Rural Stud.* 74, 45–54. <https://doi.org/10.1016/j.jrurstud.2019.11.010>
- Chalmers, D., 2013. Social innovation: An exploration of the barriers faced by innovating organizations in the social economy. *Local Econ.* 28 (1), 17–34. <https://doi.org/10.1177/0269094212463677>
- Copus, A.K., Courtney, P., Dax, T., Meredith, D., Noguera, J., Shucksmith, M., Talbot, H., 2013. European development opportunities for rural areas. *Appl. Res.* 1 (2).
- Daniel, L.J., Jenner, P., 2022. Another look at social innovation: from community – for community. *Int. J. Innov. Stud.* 6 (2), 92–101. <https://doi.org/10.1016/j.ijis.2022.04.001>
- Domanski, D., Howaldt, J., Kaletka, C., 2020. A comprehensive concept of social innovation and its implications for the local context – on the growing importance of social innovation ecosystems and infrastructures. *Eur. Plan. Stud.* 28 (3), 454–474. <https://doi.org/10.1080/09654313.2019.1639397>
- Eneqvist, A., Karvonen, A., 2021. Experimental governance and urban planning futures: five strategic functions for municipalities in local innovation. 6 (1), 183–194. <https://doi.org/10.17645/up.v6i1.3396>
- Eurostat (2022) Degree of Urbanisation Classification – 2011 Revision. [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Degree\\_of\\_urbanisation\\_classification\\_-\\_2011\\_revision#Revision\\_of\\_the\\_degree\\_of\\_urbanisation](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Degree_of_urbanisation_classification_-_2011_revision#Revision_of_the_degree_of_urbanisation). Last accessed: 29 January, 2024.
- Evans, J., Karvonen, A., Raven, R., 2016. The experimental city: new modes and prospects of urban transformation. In: Evans, J., Karvonen, A., Raven, R. (Eds.), *The Experimental City*. Routledge Taylor & Francis, London, New York.
- Evans, J., Vácha, T., Kok, H., Watson, K., 2021. How cities learn: from experimentation to transformation. *Urban Plan.* 6 (1), 171–182. <https://doi.org/10.17645/up.v6i1.3545>
- Fanning, A.L., O'Neill, D.W., Büchs, M., 2020. Provisioning systems for a good life within planetary boundaries. *Glob. Environ. Change* 64, 102135.
- Fünfschilling, L., 2019. An institutional perspective on sustainability transitions. In: Boons, F., McMeekin, A. (Eds.), *Handbook of Sustainable Innovation*. Edward Elgar Publishing Inc, Cheltenham, Northampton.
- Geels, F.W., Schot, J., 2007. Typology of sociotechnical transition pathways. *Res. Policy* 36 (3), 399–417.
- Havas, A., Scharfing, D., Weber, M.K., 2023. Innovation studies, social innovation, and sustainability transitions research: from mutual ignorance towards an integrative perspective? *Environ. Innov. Soc. Transit.* 48, 100754. <https://doi.org/10.1016/j.eist.2023.100754>
- Haxeltine, A., Pel, B., Wittmayer, J., Dumitru, A., Kemp, R., Avelino, F., 2017. Building a middle-range theory of transformative social innovation. Theoretical pitfalls and methodological responses. *Eur. Public Soc. Innov. Rev.* 2 (1). <https://doi.org/10.31637/epsir.17-1-5>
- Hertrich, T.J., Brenner, T., 2023. Classification of regions according to the dominant innovation barriers. The characteristics and stability of region types in Germany. *Reg. Sci. Policy Pract.* <https://doi.org/10.1111/rsp3.12711>
- Hervás-Oliver, J.L., Parrilli, M.D., Rodríguez-Pose, A., Sempere-Ripoll, F., 2021. The drivers of SME innovation in the regions of the EU. *Res. Policy* 50 (9), 104316. <https://doi.org/10.1016/j.respol.2021.104316>
- Hilden, M., Jordan, A., Huitema, D., 2017. Special issue on experimentation for climate change solutions editorial: the search for climate change and sustainability solutions. *The promise and the pitfalls of experimentation. J. Clean. Prod.* 169, 1–7.
- Hoelscher, K., Wittmayer, J.M., Loorbach, D., 2018. Transition versus transformation: what's the difference? *Environ. Innov. Soc. Transit.* 27, 1–3. <https://doi.org/10.1016/j.eist.2017.10.007>
- Howaldt, J., Kopp, R., 2012. Shaping social innovation by social research. In: Franz, H.-W. (Ed.), *Challenge Social Innovation: Potentials for Business, Social Entrepreneurship, Welfare and Civil Society*. Springer, Berlin, Heidelberg.
- Huitema, D., Jordan, A., Munaretto, S., Hilden, M., 2018. Policy experimentation: core concepts, political dynamics, governance and impacts. *Policy Sci.* 51 (2), 143–159. <https://doi.org/10.1007/s11077-018-9321-9>
- Jeannerat, H., Crevoisier, O., 2022. From competitiveness to territorial value: transformative territorial innovation policies and anchoring milieus. *Eur. Plan. Stud.* 30 (11), 2157–2177.
- Kronsell, A., Mukhtar-Landgren, D., 2018. Experimental governance: the role of municipalities in urban living labs. *Eur. Plan. Stud.* 26 (5), 988–1007.
- Levenda, A.M., 2019. Thinking critical about smart city experimentation: entrepreneurialism and responsabilization in urban living labs. *Local Environ.* 24 (7), 565–579.
- Leroy, J., Bailly, G., Billard, G., 2023. Introducing carsharing schemes in low-density areas: the case of the outskirts of Le Mans (France). *Reg. Sci. Policy Pract.* 15 (2), 239–255.
- Levin, K., Cashore, B., Bernstein, S., Auld, G., 2012. Overcoming the tragedy of super wicked problems: constraining our future selves to ameliorate global climate change. *Policy Sci.* 45 (2), 123–152. <https://doi.org/10.1007/s11077-012-9151-0>
- Lisetchi, M., Brancu, B., 2014. The entrepreneurship concept as a subject of social innovation. *Procedia - Soc. Behav. Sci.* 124, 87–92. <https://doi.org/10.1016/j.sbspro.2014.02.463>
- Loorbach, D., Wittmayer, J., Avelino, F., von Wirth, T., Frantzeskaki, N., 2020. Transformative innovation and translocal diffusion. *Environ. Innov. Soc. Transit.* 35, 251–260. <https://doi.org/10.1016/j.eist.2020.01.009>
- Lovell, H., Hann, V., Watson, P., 2018. Rural laboratories and experiment at the fringes: a case study of a smart grid on Bruny Island, Australia. *Energy Res. Soc. Sci.* 36, 146–155.
- MacCallum, D., Moulaert, F., Hillier, J., Vicari Haddock, S. (Eds.), 2009. *Social Innovation and Territorial Development*. Ashgate, Farnham, Burlington.
- Marchau, V., Walker, W.E., Bloemen, P., Popper, S., 2019. *Decision Making under Deep Uncertainty: From Theory to Practice*. Springer International Practice, Cham.
- Marques, P., Morgan, K., Richardson, R., 2018. Social innovation in question: the theoretical and practical implications of a contested concept. *Environ. Plan. C Polit. Space* 36 (3), 496–512. <https://doi.org/10.1177/2399654417717986>
- Martin, R., Martinelli, F., Clifton, J., 2022. Rethinking spatial policy in an era of multiple crises. *Camb. J. Reg., Econ. Soc.* 15 (1), 3–21.
- McCrory, G., Schaepeke, N., Holmen, J., Holmberg, J., 2020. Sustainability-oriented labs in real-world contexts: an exploratory review. *J. Clean. Prod.* 277, 123202. <https://doi.org/10.1016/j.jclepro.2020.123202>
- Morgan K. (2018) Experimental Governance and Territorial Development. Background paper for an OECD/EC Workshop on 14 December 2018 within the workshop series “Broadening innovation policy: New insights for regions and cities”, Paris.
- Moulaert, F., Martinelli, F., Swyngedouw, E., Gonzalez, S., 2005. Towards alternative model(s) of local innovation. *Urban Stud.* 42 (11), 1969–1990. <https://doi.org/10.1080/00420980500279893>
- The international handbook on social innovation. In: Moulaert, F., MacCallum, D., Mehmood, A., Hamdouch, A., Moulaert, F., MacCallum, D., Mehmood, A., Hamdouch, A. (Eds.), *Collective Action, Social Learning and Transdisciplinary Research*. Edward Elgar, Cheltenham.
- Moulaert, F., Jessop, B., Swyngedouw, E., Simmons, L., van den Broeck, P., 2023. *Political change through social innovation. A Debate*. Edward Elgar Publishing, Cheltenham & Northampton.
- Mulgan, G., Tucker, S., Ali, R., Sanders, B., 2007. *Social Innovation: What it is, Why it Matters and How it can be Accelerated*. Young Foundation, London.
- Murray R., Caulier-Grice J., Mulgan G. (2010) *The open book of social innovation*. Nesta, London.
- Nevens, F., Frantzeskaki, N., Gorissen, L., Loorbach, D., 2013. Urban transition labs: co-creating transformative action for sustainable cities. *J. Clean. Prod.* 50, 111–122.
- de Olde, C., Oosterlynck, S., 2022. The countryside starts here: how the urban-rural divide continues to matter in post-urban Flanders. *Eur. Urban Res. Stud.* 29 (3), 281–296.
- Pel, B., Haxeltine, A., Avelino, F., Dumitru, A., Kemp, R., Bauler, T., Kunze, I., Dorland, J., Wittmayer, J., Jørgensen, M.S., 2020. Towards a theory of transformative social innovation: a relational framework and 12 propositions. *Res. Policy* 49 (8), 104080. <https://doi.org/10.1016/j.respol.2020.104080>
- Raven, R., Sengers, F., Spaeth, P., Xie, L., Cheshmehzangi, A., de Jong, M., 2019. Urban experimentation and institutional arrangements. *Eur. Plan. Stud.* 27 (2), 258–281. <https://doi.org/10.1080/09654313.2017.1393047>
- Raworth K. (2012) *A safe and just space for humanity: can we live within the doughnut?* Oxfam, Oxford.
- Rogge, K.S., Stadler, M., 2023. Applying policy mix thinking to social innovation: from experimentation to socio-technical change. *Environ. Innov. Soc. Transit.* 47, 100723. <https://doi.org/10.1016/j.eist.2023.100723>
- Roggema, R., 2016. The future of sustainable urbanism: a redefinition. *City, Territ. Archit.* 3 (1), 22.
- Schäpke N., Stelzer F., Bergmann M., Singer-Brodowski M., Wanner M., Caniglia G., Lang D.J. (2017) *Reallabore im Kontext transformativer Forschung: Ansatzpunkte zur Konzeption und Einbettung in den internationalen Forschungsstand*. IETSR Discussion papers in Transdisciplinary Sustainability Research. Leuphana Universität, Lüneburg.
- Schermer, M., Kroismayr, S., 2020. Social innovation in rural areas. *Österreichische Z. F. üR. Soziol.* 45, 1–6. <https://doi.org/10.1007/s11614-020-00398-w>
- Schreuder, W., Horlings, L.G., 2022. Transforming places together: transformative community strategies responding to climate change and sustainability challenges. *Clim. Action* 1 (1).
- Sengers, F., Wiecekorek, A.J., Raven, R., 2019. Experimenting for sustainability transitions: a systematic literature review. *Technol. Forecast. Soc. Change* 145, 153–164.
- Seyfang, G., Smith, A., 2007. Grassroots innovations for sustainable development: Towards a new research and policy agenda. *Environ. Polit.* 16 (4), 584–603.
- Sovacool, B.K., Brugger, H., Brunzema, I., Dañkowska, A., Wemyss, D., Vernay, A.L., Betz, R., Avelino, F., de Geus, T., Tessa Dembek, A., et al., 2023. Social innovation supports inclusive and accelerated energy transitions with appropriate governance. *Commun., Earth Environ.* 4 (1). <https://doi.org/10.1038/s43247-023-00952-w>
- Steen, K., van Bueren, E., 2017. The defining characteristics of urban living labs. *Technol. Innov. Manag. Rev.* 7 (7), 21–33. <https://doi.org/10.22215/timreview1088>
- Steffen, W., Richardson, K., Rockström, J., Cornell, S.E., Fetzer, I., Bennett, E.M., Biggs, R., Carpenter, S.R., de Vries, W., de Wit, C.A., Folke, C., Gerten, D., Heinke, J., Mace, G.M., Persson, L.M., Ramanathan, V., Rayers, B., Sörlin, S., 2015. Planetary boundaries: guiding human development on a changing planet. *Science* 347 (6223), 1259855. <https://doi.org/10.1126/science.1259855>
- Stoustrup, S.W., 2022. A rural laboratory in the Austrian Alm. Tracing the contingent processes fostering social innovation at the local level. *Sociol. Rural.* 12372. <https://doi.org/10.1111/soru.12372>
- Suiter, J., 2021. Towards Transformative Change. Die Schlüsselemente experimenteller Ansätze in der städtischen Klimawandelanpassung erforschen. *The Public Sector* 47 (2), 53–64. <https://doi.org/10.34749/oes.2021.4608>

- Suitner, J., Haider, W., Philipp, S., 2023. Social innovation for regional energy transition? An agency perspective on transformative change in non-core regions. *Reg. Stud.* 57 (8), 1498–1510. <https://doi.org/10.1080/00343404.2022.2053096>
- Suitner, J., Krisch, A., Aigner, A., 2022. All hail the new king? Critically reflecting on urban experimentation for transformative change. In: Fritz, J., Tomaschek, N. (Eds.), *Transformationsgesellschaft. Visionen und Strategien für den sozialökologischen Wandel*, Waxmann, Vienna.
- Suitner, J., Krisch, A., 2023. Navigating context in experiments: The “real,” the roots, the rationale. *Eur. Urban Reg. Stud.* <https://doi.org/10.1177/09697764231205218>
- Tassey, G., 2014. Innovation in innovation policy management: the experimental technology incentives program and the policy experiment. *Sci. Public Policy* 41 (4), 419–424. <https://doi.org/10.1093/scipol/sct060>
- Thaler, T., Penning-Rowsell, E.C., 2023. Policy experimentation within flood risk management: transition pathways in Austria. *Geogr. J.* 12528. <https://doi.org/10.1111/geoj.12528>
- Turnheim, B., Kivimaa, P., Berkhout, F., 2018. Experiments and beyond. In: Turnheim, B., Kivimaa, P., Berkhout, F. (Eds.), *Innovating Climate Governance*. Cambridge University Press, Cambridge, pp. 216–241.
- UNDP [United Nations Development Programme] (2002) Handbook on monitoring and evaluating for results. Evaluation Office.
- van den Heiligenberg, H.A., Heimeriks, G.J., Hekkert, M.P., van Oort, F.G., 2017. A habitat for sustainability experiments: success factors for innovations in their local and regional contexts. *J. Clean. Prod.* 169, 204–215.
- Wamsler, C., Brink, E., Rivera, C., 2013. Planning for climate change in urban areas: from theory to practice. *J. Clean. Prod.* 50, 68–81.
- Wanner, M., Hilger, A., Westerkowski, J., Rose, M., Stelzer, F., Schäpke, N., 2018. Towards a cyclical concept of real-world laboratories: a transdisciplinary research practice for sustainability transitions. *DisP. - Plan. Rev.* 54 (2), 94–114.
- Wanner, M., Bachmann, B., von Wirth, T., 2021. Contextualising urban experimentation: analysing the Utopiastadt campus case with the theory of strategic action fields. *Urban Plan.* 6 (1), 235–248. <https://doi.org/10.17645/up.v6i1.3629>
- Webb, R., O'Donnell, T., Auty, K., Bai, X., Barnett, G., Costanza, R., Dodson, J., Newman, P., Newton, P., Robson, E., Ryan, C., Stafford Smith, M., 2023. Enabling urban systems transformations: co-developing national and local strategies. *Urban Transform.* 5 (1), 1–31. <https://doi.org/10.1186/s42854-023-00049-9>
- Wittmayer, J.M., de Geus, T., Pel, B., Avelino, F., Hielscher, S., Hoppe, T., Mühlemeier, S., Stasik, A., Oxenaar, S., Rogge, K.S., Visser, V., Marín-González, E., Ooms, M., Buitelaar, S., Foulds, C., Petrick, K., Klarwein, S., Krupnik, S., de Vries, G., Wagner, A., Härtwig, A., 2020. Beyond instrumentalism: broadening the understanding of social innovation in socio-technical energy systems. *Energy Res. Soc. Sci.* 70, 101689. <https://doi.org/10.1016/j.erss.2020.101689>