Changing the lens: Micro-systemic change through design interventions

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Abstract: This paper examines how design-led activities function as micro-systemic interventions that can influence people's perceptions, actions and decision-making towards the futures. Using the optical metaphor of a design lens, we reinterpret Voros' (2003) Futures Cone as a flexible field of vision that can be focused, dispersed, or magnified through design. The "design lens" serves as a conceptual framework comprising three components: design settings, information, and collectiveness. We apply this lens to two projects: a speculative walking workshop for policymaking, and a creative engagement project with residents in a social housing redevelopment. The aim is to examine how these elements interacted and how design activities were reshaped in response to participants' interactions. Our discussion emphasises its potential to influence people's worldview, addressing the importance of the ethical implications in micro-systemic design. We argue that systemic change can emerge through micro-interventions situated in collective, reflective, and crucially ethical design settings.

Keywords: design lens; systemic design; micro-systemic intervention; participatory methods

1. Introduction

Systemic design is an interdisciplinary area at the intersection of design studies and system sciences (Jones & Kijima, 2019). Systemic design aims to engage with complexity across multiple levels of social and organisational systems, enabling systemic transformations (Jones, 2014; van der Bijl-Brouwer & Dorst, 2017). As Vink (2023) points out, "the practice of designing social systems is pervasive and mundane" and does not happen to systems but within and through them. We align with this idea, which reframes systemic design from expert-driven change to the cultivation of collective reflexivity. However, we acknowledge that curated and designed design interventions could affect individual and collective perspectives towards systemic change. Our focus is on analysing and reflecting on how designed artefacts, interactions, and collective moments could affect people's worldviews. In

particular, we consider how design interventions shape individual and collective perspectives and deserve close attention.

Before systems change can occur, people must be able to imagine alternative possibilities. Futures thinking, participatory workshops, speculative artefacts, and co-design activities are common spaces in which these imaginaries take shape. In these moments, participants are immersed in an environment usually curated by designers or design researchers who craft collective encounters mediated by tools and methods, physical, digital, or hybrid spaces, and insights and information. In these encounters, participants not only share their lived experiences but also begin to see things differently. Their perceptions of their past, present, and futures may be shaped by design.

To describe this phenomenon, we borrow a metaphor from optics: just as a lens refracts light by focusing, dispersing or magnifying it, design encounters bend perceptions by refracting participants' experiences of the past, present and possible futures — shaped by design settings, information and collectiveness. The aim of this paper is to use the design lens as a framework for understanding micro-systemic mechanisms of change. We analyse how design settings, information, and collectiveness interact to influence perception and meaning making.

2. Level Systems to Micro-Systemic Encounters

2.1 Systemic and Multi-Level Perspectives

Systemic design relies heavily on concepts from system theory and the multi-level perspective (MLP) developed in transition studies (Geels, 2011; Geels & Schot, 2007). MLP focuses on the basis that society and technology co-evolve within three multilayered systems: the landscape (macro forces), regimes (meso-level), and niches (micro level) (Geels, 2002). MLP has helped design scholars in different ways, such as to articulate problems (Wallace, 2021), to analyse design framings as a core practice in design transitions (Peeters et al., 2025), and to describe how design interventions occur at different levels of systems (Irwin et al., 2022; Joore & Brezet, 2015). While the use of MLP has been helpful for situating the contribution of design research within sustainable transitions, the micro level of socio-technical change remains under-explored. Engaging communities in speculative exploration raises ethical questions regarding whose futures are made visible, whose concerns are legitimised, and how imaginative interventions may influence expectations or hopes. Designers, therefore, play a critical role in shaping not only artefacts but also the perceptual infrastructures through which futures are collectively negotiated.

Nevertheless, these perspectives mostly focus on how systems are organised and the role of design within these structures, rather than on how people's experience, interpret and make sense of these systems. While systemic design and transition studies have been effective in mapping interactions across landscape, regime and niche levels, they offer limited insight into how systemic change is experienced and enacted through situated encounters. In particular, less attention has been paid to how individuals interpret, negotiate and reconfigure meanings of possible futures within design interventions.

The relative lack of attention to lived experiences has led to critiques arguing that systemic transformation cannot be reduced to artefacts and institutions across levels; instead, it also depends on the micro-foundations, the everyday interactions of people, how they make

sense of the work and reproduce systems (Vink, 2023). From this perspective, systemic change (and particularly from a design perspective) is not only about the upstream effects of design interventions but also about re-shaping relations, meanings and practices at the level of lived experiences. This shift opens space to understand design not only as a strategic lever to understand systemic change but as a situated and context-dependent process embedded in everyday life.

2.2 Participatory, Speculative and Co-Design Perspectives

Participatory design (PD) has a long-standing tradition of valuing experiential knowledge, mutual learning and collective sense-making (Björgvinsson et al., 2012; Ehn, 2008; Robertson & Simonsen, 2013). PD has evolved to address societal issues through the collaboration of diverse stakeholders to imagine alternative futures (Björgvinsson et al., 2012; Hillgren et al., 2011; Light & Akama, 2014). Further, researchers have explored in depth the relational ethics and care around PD pointing out that participatory encounters shape identities and outcomes (Frauenberger et al., 2017; Light & Akama, 2018). Participatory encounters not only redistribute decision-making power but also reshape how participants understand their own agency and the horizons of possible change. However, PD still tends to focus on process design and power distribution rather than how people reconfigure meaning from their lived experiences and possibilities as they imagine futures collectively.

Speculative and critical design approaches have expanded the PD tradition by positioning imagination, provocation and reflexivity as central to design inquiry. Critical design frames artefacts as arguments that open spaces for debate and ethical considerations (Malpass, 2019). Through provocative artefacts or future scenarios, speculative design invites people to reflect on the kinds of futures that are desirable and for whom (Dunne & Raby, 2013). Researchers describe these artefacts as devices of articulation that mediate the formation of publics by generating shared concerns, values and conflicts visible (DiSalvo, 2012; Kolks, 2023). In participatory settings, these devices enable participants to actively articulate their positions and imaginations.

Nevertheless, these approaches have been critiqued because they tend to privilege the authorial perspective of designers, limiting people's participation to interpretive rather than generative roles (Bardzell & Bardzell, 2013). Several researchers also point out the origins of speculative and critical design since they tend to emerge from Western, studio-based context, reproducing dominant perspectives and aesthetics (Bardzell & Bardzell, 2013; DiSalvo, 2022; Tonkinwise, 2014). In response, approaches such as participatory speculative design, participatory speculation, and socially engaged design reposition speculation in lived experiences and collective imagination, paying attention to the relational ethics and care in the creation of futures (Kwon, 2024; Farias et al., 2022; Forlano & Mathew, 2014; Gerber, 2018; Heidingsfelder et al., 2015).

Co-design and speculative practices can be integrated to create collective, alternative futures through making, dialogue, and reflexivity. Co-design provides a participatory structure for speculation to emerge from communities themselves, rather than through external projection or interpretation of the community context. This collective and collaborative speculation enables participants to co-create scenarios, challenge assumptions, and articulate their concerns. Perez and colleagues (2022) argue that such processes foster

collective reflexivity, helping participants imagine and materialise new social relations and meanings.

3. Methodological Approach

This paper adopts a reflective and practice-based methodological approach informed by our positionality as researchers directly involved in two design research projects. Rather than observing design encounters from a distance, knowledge was generated through our participation in planning, facilitating and adapting participatory activities in situ. While this approach draws on Schön's (1983) notion of reflection-in-action, it is further supported by recent scholarship on introspective methods in design research, which argues that the backstage dynamics of design practice can provide valuable analytical insights (Bofylatos & Perez, 2026).

In this study, we utilised introspective observations as empirical material. Moments of tension, uncertainty and surprise experienced during facilitation were documented as reflexive triggers that enabled us to examine how design encounters influenced participants' engagements with materials, discussions and future-oriented thinking. These reflections were captured through field notes, photographic documentation of activities and artefacts, project reports and retrospective conversations among the research team. Revisiting these materials allowed us to explore how participatory interventions shaped processes of meaning-making over time.

Each project was initially documented in reflective notes and analysed as an individual case, following principles of qualitative case study research (Yin, 2014) and positioning design research projects as part of the creative practice of researchers (Gray & Malins, 2016). Subsequently, we conducted a retrospective cross-case analysis in which both cases were revisited together to identify recurring patterns in how design settings, information and collective configurations influenced the unfolding of participatory encounters. Through iterative reflection and dialogue with relevant literature, these observations informed the identification of refractive effects conceptualised as magnifying, focusing and dispersing. These analytical insights formed the foundation for the conceptual framework presented in the following section.

4. Conceptual Framework: The Design Lens

We reflected on the existing body of literature, adopting collaborative, participatory, and speculative design practices as a means of systemic change at the micro level, which may shape an individual's perceptions. At the same time, the ethos of participatory and collaborative design ensures inclusion and dialogue, speculative design challenges current assumptions and broadens imaginative possibilities. This combination enables intervention with care and empathy in the creation of a collective vision. However, while these approaches create conditions for participation and imagination, they offer limited analytical vocabulary to describe how specific design encounters reshape participants' perceptions of past experiences, present realities and possible futures.

Building on this, we propose a conceptual framework for understanding how design influences an individual's perception of possible futures and their reflection on experiences and values, using the metaphor of lenses. Just as an optical lens refracts light, a design lens

could redirect experiences, enabling participants to magnify their scope of futures or reflect on their assets, including experiences, skills and capacities. Through design activities, individuals may gain new knowledge, understand others' worldviews, expand their perceptions toward alternative futures, or revisit their own lived experiences to recognise their expertise and values. In this sense, the design lens does not prescribe particular futures but helps explain how participatory encounters can redirect attention, surface overlooked concerns and expand or constrain the horizons of what participants perceive as possible.
In this framework, we adopt the Futures Cone, a diagram first introduced by Hancock and Bezold (1994) and later popularised by Voros (2003). The model is widely used in speculative design practices to represent diverse future domains. We also draw on the hermeneutic model of the future, an extended version that incorporates the domain of past experiences (Coulton & Lindley, 2017). However, in this paper, we use the metaphor of the cone not to represent different types of futures but as a conceptual device from which participants' viewpoints, including reflective (past) and refractive (future) domains (Figure 1). We propose that the domains represented by the cone are flexible, reflective and refractive, capable of being reshaped through the participation in design activities. This perspective shifts attention from viewing futures exploration primarily as a representational exercise toward understanding how design activities reconfigure meaning-making processes within everyday situations where systemic change is gradually enacted.

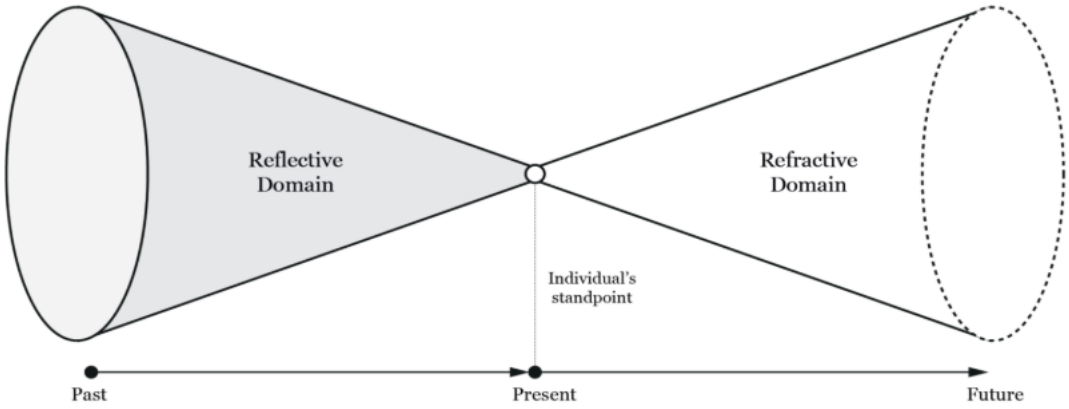

Figure 1 Dual perspective cone with reflective and refractive domains

Three elements constitute the design lens: design settings, information, and collectiveness (Figure 2). These elements are controlled by designers who plan and organise design activities, considering what, how and when, and determine who will be involved in the process.

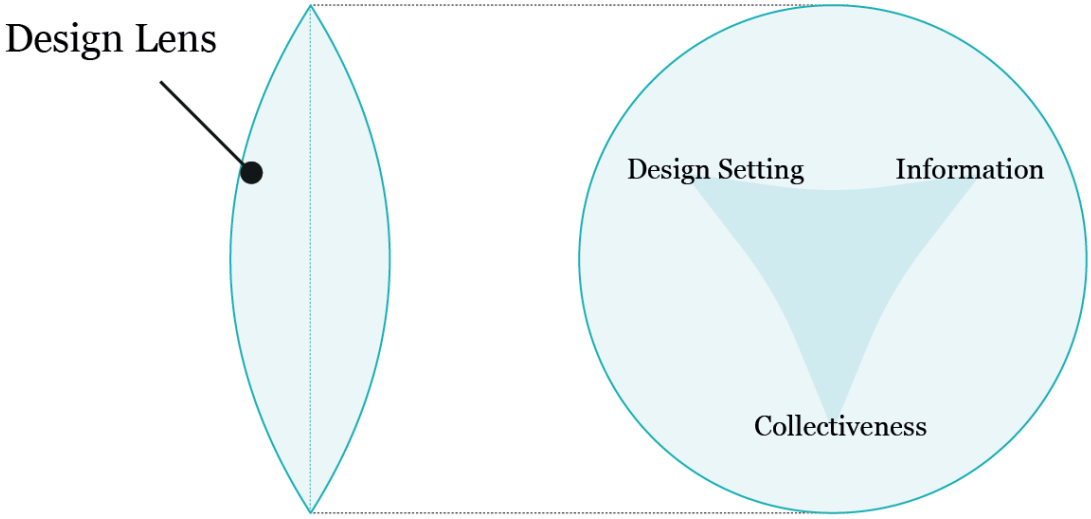

Figure 2. Design Lens: design settings, information, and collectiveness

First, design settings refer to the tangible aspects of the activity, such as physical or hybrid spaces and tools (Sanders & Stappers, 2014). The choice of location is closely connected to the recruitment strategy, for instance, when and how participants are invited. Design settings include spaces, materials and tools that enable participants to engage in the construction of futures.

Second, information refers to the data, narratives and framings (Bjögvinsson et al., 2012; Prendeville et al., 2022) that designers choose to share with participants. It is not limited to providing contextual background but is closely tied to the ethics of the process, mediating transparency and reciprocity between designers and participants. These decisions also carry ethical implications, as the selection and framing of information can legitimise certain futures while rendering others less visible or less discussable. Information is also linked to tools and materials, as designers decide how it is translated and presented through maps, prompts, artefacts or scenarios. In collaborative settings, this often involves translating complex or technical knowledge into accessible forms, enabling participants without specialist expertise to engage meaningfully. In this way, information supports shared understanding and underpins communication and collaboration around complex social challenges.

Lastly, collectiveness refers to the dynamic interactions among participants and with facilitators, who are part of the design team. Synergies of collectiveness can emerge when people are brought together in shared spaces and democratised design processes. In particular, designers can critically decide who to invite and whether to engage them heterogeneously or separately. This element also reflects on the positionality of designers, whose roles and decisions can shape or reinforce power dynamics within the process. Moreover, power relations may exist among stakeholders and between participant groups, influencing how collaboration and decision-making unfold (Knutz & Markussen, 2020). As diverse perspectives are brought into dialogue, collective encounters may generate tensions, disagreements or competing visions, which can play an important role in expanding the

range of futures considered. The interactions among diverse stakeholders enable the exchange of opinions, the sharing of knowledge, and mutual learning throughout the design process. This element is also related to situation-based design, in which designers critically consider contextual factors and power relations before engagement (Greenbaum & Loi, 2012).

The three elements are non-hierarchical but closely interconnected. They constitute an integrated lens shaped by designers, who can structure participatory processes, mediate collaboration, and foster mutual learning throughout the design practice. Through this lens, participants in design activities may begin to view their futures differently, such as considering alternative future scenarios. As suggested in the diagram, an individual can broaden their perspectives (magnifying effect) or refine their focus on a particular topic (focusing effect), while also reflecting on their past experiences, values, and contexts and revisit their assumptions through the design lens (dispersing effect) (Figure 3). These refractive effects are not predetermined outcomes, but emergent qualities of situated encounters shaped through the interaction of design settings, information and collective dynamics.

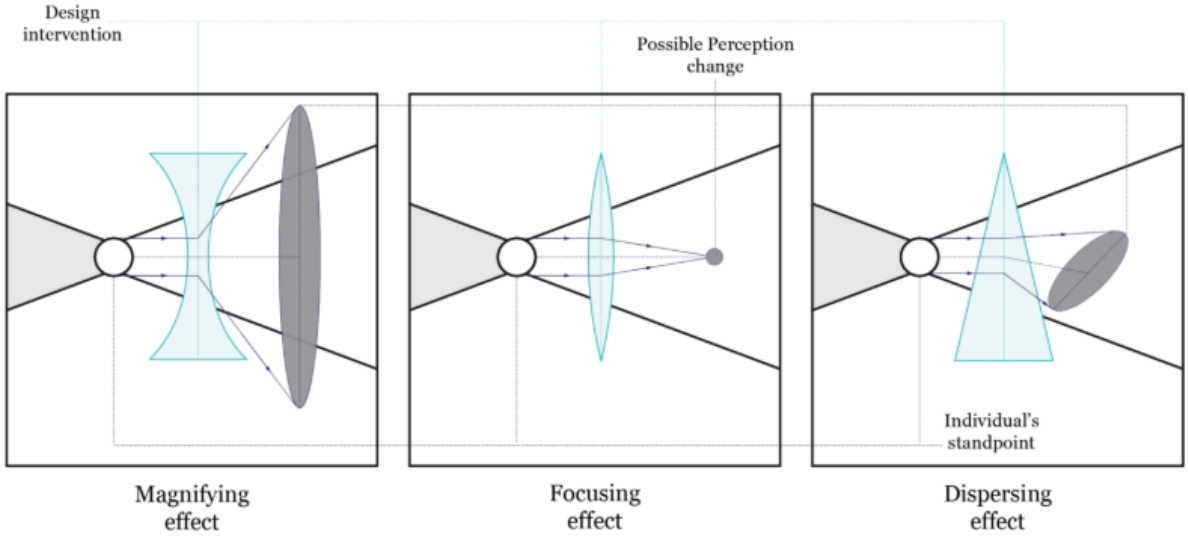

Figure 3. Design lens as an intervention, generating different refractive effects

5. Case Studies – Refractive Encounters in Practice

5.1 P-PITEE: Participatory Policymaking Walkshops

The Participatory Policies for IoT (at the Edge) Ethics (P-PITEE) took place in Lancaster, UK. It aimed to support policymaking for the transparent and ethical deployment of Internet of Things (IoT) sensors in public spaces through participatory design. Local governments needed to consider the practical, technical, and ethical dimensions of IoT deployment, both when installing devices themselves and when assessing proposals from external organisations (Kwon et al., 2023). As a result, the research team provided a policy draft to the local authority. Building on its early success in Lancaster, the team was funded for a public engagement stage titled Taking IoT for a Walk, which adapted the same design methods while collaborating with four city councils. The author contributed as both a

research assistant and a designer, actively engaging in project planning and responsible for design tools and the development of design methods.

5.1.1 Design Settings

The project combines design fictions and walking workshops (walkshops), guided urban walks designed to prompt critical reflection on the presence and implications of IoT technologies in public spaces. Design fictions are one genre of speculative design, presenting speculative and provocative design ideas in various forms, such as written stories, exhibitions, and short films (Blythe, 2014; Coulton & Lindley, 2017). Each walk lasted around 20 minutes and covered accessible routes. Along the routes, participants encountered design fiction artefacts and real examples of IoT devices, such as sensors, smart bins, and surveillance technologies. These artefacts were used to provoke speculation and discussion about visibility, ethics, and governance of IoT deployment in the public spaces. Some of the design fictions took the form of public signage, including speculative Icons for AI legibility adopted from Lindley et al. (2020). They were intentionally positioned alongside existing street signs. The designer used similar typography and visual style to blend the fictional elements into the everyday urban landscape, enhancing their sense of realism and mundanity.

Participants received a map with the route and a field guide featuring descriptions of the artefacts, site images, and prompt for reflection. In the early version, the guides retained blank spaces that participants filled in with stickers containing the artefact descriptions, after speculation about whether the artefact was real or fictional. However, after observing participants' interactions with the tool, the team identified practical challenges with sticker use. The designer developed several versions of field guides over the walkshops, which were eventually replaced with Post-it Notes covering pre-printed descriptions (Figure 4).

Figure 4. Participant revealing the design fiction by removing a Post-it Note

5.1.2 Information

The information layer of the project combined factual content with speculative narratives. Participants were presented with a mix of real-world technologies (such as deployed sensors for measuring air pollution) and design fiction provocations, including speculative artefacts like a public sign warning that 'drones may be operating in this area' (Figure 5). The design team curated and translated technical information into accessible formats, supporting inclusive discussions among participants with varying levels of expertise.

Figure 5. Speculative drone-warning sign placed among public signage

In the public engagement stage, the design fictions were tailored, adopting more place-based elements and the focus required by the local authorities. The research team travelled to each city, held discussions with the authorities to understand their needs for communicating with the public, mapped their real sensors and IoT deployments, checked the route and decided on stops, and then created design fictions and updated the tools based on them. For example, one city prioritised data governance, prompting a data-focused walkshop. This customised approach enabled the council's needs to be addressed directly while allowing the research team to respond more effectively to the place-based priorities of the local context.

Furthermore, information was exchanged on-site during the workshop. Some participants mistakenly believed that the 15-minute city was conspiratorial, assuming it was an attempt by the government to regulate their mobility. The research team provided additional information to clarify and address these misconceptions, explaining that it is an urban planning concept that emphasises residents' access to essential amenities within a 15-minute walking distance (Moreno et al., 2021).

5.1.3 Collectiveness

The project involved different groups of participants at each stage. The first stage of the project took place within Lancaster's local government, involving policymakers from different departments. During the walkshop, the mix of expertise led to learning for the

research team, as well as knowledge exchange among the participants. In the first walkshop, when participants reached the design fiction stop featuring a “smart bin,” a public realm officer revealed that bins equipped with sensors were already in use within the city. This unexpected discovery, that the speculative design had become reality, surprised both the research team and other policymakers. This moment also revealed gaps in internal communication and the persistence of departmental silos within the local authority.
In a public engagement phase, the walkshops were extended to include a broader range of participants, including mixed groups of policymakers and community members, as well as groups composed solely of one or the other. The mixed group created moments of tension and curiosity, particularly from members of the public, as they mostly listened to what policymakers had to say during the walkshop. Some participants expressed scepticism or distrust toward technology, occasionally referencing conspiracy theories. These instances required the facilitators to mediate and contextualise discussions. However, they also provided opportunities for the research team and policymakers to better understand the diversity of public perspectives.

Figure 6. Walkshop with a mixed group of policymakers and community members

Following the walkshops, several participants approached the team to share their reflections, noting that the experience increased their awareness of technological implementations in public spaces. They commented that the walkshop helped them recognise both the benefits and risks of such technologies and that they would pay closer attention to public signage, sensors, and other devices embedded in the urban environment. These interactions illustrate how the design produced a magnifying effect on a specific topic, the potential IoT deployments in public spaces and their current uses. At the same time, some participants may have experienced a dispersing effect through the speculative walkshop, envisioning how such systems function in public environments, which challenge existing conspiracy beliefs or technology-related mistrust. This case reveals how collective

encounters within speculative design practice can surface tensions, stimulate dialogue, and foster micro-systemic changes, which can be small but potentially significant shifts in perception and understanding that exemplify the refractive nature of the design lens framework.

5.2 My Mainway: Residents Re-Imaging a Neighbourhood

This project took place in the early stages of the redevelopment of Mainway, a social housing estate managed by the Lancaster City Council in the UK. The estate required significant investment to address long-standing maintenance issues. During 2020, the City Council was considering different options, including full refurbishment, partial redevelopment, or complete demolition, each carrying substantial social and emotional implications for tenants. In this context, a group of researchers from Lancaster University was invited to conduct a creative consultation process to ensure that residents could express their views and influence discussions about the future of the estate.

The consultation was conducted during the COVID-19 pandemic, when social distancing regulations were in place and digital communication had become the predominant mode of engagement. However, relying solely on digital participation risked excluding residents who faced barriers to accessing or using online platforms. The team therefore prioritised in-person, socially distanced encounters, enabling informal conversations that felt situated and safe. Through this approach, approximately 70% of the five hundred households across the estate were engaged.

5.2.1 Design Settings

The process comprised a series of design-led interventions to make redevelopment more legible and inclusive. Activities were designed to surface situated knowledge of place, reduce the perceived distance between the Council's aspirations and residents' everyday experiences, and create multiple opportunities for people to express concerns and ambitions regarding the future of their neighbourhood.

Walkshop tours residents defined routes and stopping points, provided a platform for long-term tenants to narrate the estate from their own perspective. These narrated journeys revealed spatial memories and attachments often absent from formal planning processes. For instance, at one stop a resident reflected on a mosaic placed beside a bin storage area, recalling that a young man had been killed few years earlier. For newer residents the mosaic had previously appeared as a decorative feature, yet hearing this story prompted conversations about safety and anti-social behaviour. The exchange shifted attention from viewing redevelopment primarily as a technical housing intervention towards recognising the estate as a socially layered environment shaped by histories of loss, care, and community relations.

Figure 7. Walkshop with residents of Mainway, Lancaster, UK

Door-to-door conversations were designed to reach those less inclined to participate in organised activities or who experienced reduced mobility. Facilitators introduced gentle speculative prompts such as “if you had a magic wand, what would you change about your flat?” While such prompts invited potentially radical reflections, many initial responses focused on essential repairs, such as replacing boilers or installing new windows, suggesting that residents’ ability to imagine future possibilities was limited by years of disinvestment. In some encounters, residents expressed scepticism about redevelopment, stating that immediate needs should be addressed before considering broader change. In one exchange, however, reframing the prompt toward imagining what a “good day at home” might look like encouraged a resident to move beyond maintenance concerns to discuss shared outdoor areas and opportunities for neighbourly interaction.

Graffiti-based workshops sought to engage young people in articulating values they believed should guide redevelopment. Prototyping and drawing activities with children offered playful but insightful reflections on how public spaces might be used differently. In one session, a child proposed a go-kart route running through the estate’s central pathways. Although initially perceived as unrealistic, this idea later informed discussions with adult participants about mobility, traffic safety, and shared communal infrastructure, illustrating how speculative imaginaries generated in one setting could influence conversations in another.

Figure 8. Prototyping activities with children

5.2.2 Information

All information shared with residents was based on the Council's official redevelopment brief. The research team operated as intermediaries between the Council and the community, translating technical and policy language into everyday terms while managing expectations about the project's scope. Facilitators frequently needed to support residents in imagining futures not entirely determined by present material constraints. During one discussion at the project hub, a resident expressed fear that redevelopment would inevitably lead to displacement. By sketching alternative redevelopment scenarios and discussing phased renovation approaches, facilitators enabled consideration of futures in which residents might remain within the estate, opening space for more nuanced interpretations of possible change.

Residents also raised concerns beyond the project brief, including anti-social behaviour, deterioration of communal spaces, anxieties about proposed infrastructure such as a 5G antenna, and longstanding mistrust toward the Council. Addressing these issues required a sensitive balance between acknowledging their significance and avoiding over-promising outcomes. Such encounters revealed how external facilitation could act as a channel for surfacing unresolved issues, particularly in contexts where institutional trust was fragile.

5.2.3 Collectiveness

The Mainway estate is socially and culturally diverse, and this diversity shaped the consultation process. Intergenerational and intercultural exchanges emerged as residents reflected on the estate's past, present, and possible futures. In sessions tailored to different age groups, children imagined playful interventions such as go-kart tracks, while older residents prioritised accessible housing, including step-free bungalows. When these contrasting visions were later displayed through exhibition materials in the project hub, they

broadened collective understanding of what redevelopment could entail, revealing complementary yet divergent aspirations.
To sustain engagement, the Council provided a vacant retail unit that functioned as a project hub. This space enabled ongoing dialogue between residents and council officers and served as an exhibition venue for materials produced during activities. Asynchronous tools, including a public pin-up board for questions and responses, allowed residents to contribute at their own pace. In the weeks following the interventions, some residents began returning independently to seek updates or share additional ideas, while others encouraged neighbours who had not previously participated to engage. These continued interactions suggested that consultation was increasingly perceived not as a one-off event but as an opportunity for more active involvement in shaping redevelopment discussions.
Across these encounters, design settings enabled residents to connect memories, present concerns, and speculative possibilities. Information reframing supported shifts from immediate repair needs toward situated future imaginaries, while collective engagements introduced plural and sometimes conflicting visions. Rather than resolving tensions, the process expanded the range of futures considered legitimate within conversations about the estate's transformation.

6. Discussion

The two cases illustrate how design interventions can operate as refractive encounters that reshape how participants interpret past experiences, present circumstances and possible futures. Rather than producing immediate systemic change, these interventions contribute to shifts in perception, meaning-making and relational dynamics that influence how change is imagined and enacted. We explored micro-level design-led interventions aimed at supporting people's imaginings to inform local policymaking. Across these cases, we argue that each refractive encounter can influence people's worldviews. When working in collaborative settings, such encounters may shift the public's perceptions, practices and narratives. Drawing on social practice theories (Nicolini, 2012; Reckwitz, 2002; Shove et al., 2012), we contend that as new understandings and meanings circulate, new practices emerge, which influence wider regimes.
The conceptual design lens introduces two main possibilities for inquiry. First, it demonstrates how different elements shape changes in people's perceptions of futures, conceptualised as refractive effects that magnify, focus or disperse. These effects correspond to the aims of design activities and help designers and design researchers reflect on why and how they involve people. Second, by decomposing the lens into three interconnected components (design settings, collectiveness and information), it enables critically consider role in shaping refractive processes, including the ethical considerations involved in planning and facilitating design activities. We emphasise the need to acknowledge our positionality as designers and facilitators: we actively construct the conditions of engagement and, even with good intentions, influence participants' experiences, interpretations and transformations.
In the cases presented, different refractive effects became visible. Some encounters enabled participants to broaden their understanding of possible futures by recognising overlooked opportunities or resources (magnifying). In other moments, attention became concentrated on specific concerns, such as safety, mobility or shared spaces, allowing participants to

articulate situated future propositions (focusing). Collective exchanges also generated divergent or competing imaginaries, expanding the spectrum of futures (dispersing).

As highlighted in the existing literature, systemic change is often difficult to achieve at the macro level, making smaller-scale, micro-level interventions necessary (Vink, 2023). Influencing individuals through design activities at this scale is therefore essential. Across the two case studies, we observed how these small interventions generated shifts in participants' awareness, understanding and attitudes. These micro-level changes demonstrate the potential of design practice to contribute to broader systemic transformation.

In the first case study, speculative artefacts placed in the city increased people's awareness of technological implementations in public spaces. This increase can be understood as a magnifying effect of the design intervention. The walkshop presented in the second case enabled participants to focus on public spaces and collectively articulate the meanings attached to them. Together, the recognition of benefits and potential risks of technologies in urban environments in case one, and the design team's role in expanding participants' sense of possibility in case two, illustrate how refractive effects operate in practice. These perceptual shifts did not necessarily resolve tensions or lead to consensus. Instead, they expanded the range of futures considered legitimate. Participants moved from framing change in terms of immediate maintenance needs or abstract redevelopment plans toward articulating situated and relational understandings of what transformation might entail.

Our findings suggest that micro-systemic change depends on the perceptual infrastructures through which futures are imagined. Immersive experiences created through well-crafted design settings, the information provided and the collective encounters enabled by participatory approaches all influence how futures are perceived. Designing these infrastructures is not only an aesthetic endeavour but also an ethical one. Having recognised the effects of design interventions, these insights point to the need for follow-up methods tracing how participants' perceptions evolve over time, revealing whether engagement magnifies, focuses or disperses their ways of imagining futures.

While the projects did not produce systemic transformation, they contributed to early trajectory signals. Continued engagement with participatory spaces, the circulation of new narratives about redevelopment, and emerging expectations of involvement in decision-making suggest that micro-level perceptual shifts can influence how actors position themselves within broader processes of change. From this perspective, systemic transformation can be understood as emerging through the accumulation of situated encounters that reshape relations, practices and meanings over time. At the same time, shaping imaginative horizons carries ethical responsibilities. Expanding possible futures may raise expectations that cannot be fulfilled or surface tensions that require careful facilitation. Designers, therefore, play a critical role in mediating participation with sensitivity to context, power relations and the emotional implications of engaging with uncertainty.

This paper suggests that there might be three refractive effects (magnifying, dispersing and focussing); however, we acknowledge that other effects may exist. The metaphor of the refractive lens is not exhaustive, and future research might reveal additional ways in which design activities shift perceptions of futures. Thus, our framework should be considered as a starting point for understanding micro-level refractions rather than a comprehensive typology. For practitioners, the design lens offers a way to reflect on how decisions regarding settings, information and collective configurations may influence not only participation

outcomes but also how change is perceived and negotiated. This perspective may support more intentional design of encounters that foster reflection, plurality and situated futures thinking across different organisational or community contexts.

7. Conclusion

This paper examined how design-led encounters operate as micro-systemic interventions that reshape how people perceive past experiences, engage with present conditions and imagine possible futures. Using the design lens, which brings together design settings, information and collectiveness, we showed how participatory activities can focus, disperse or magnify participants' views, reframing the Futures Cone as a lived and situated field of perception rather than a representational model.

The two case studies demonstrated how these refractive effects unfold through interactions. In the P-PITEE project, speculative walkshops increased awareness of technological infrastructures in public space, prompting participants to reconsider their relationships with systems. In My Mainway, creative engagement supported residents in articulating situated understandings of place and redevelopment possibilities. Across both cases, these perceptual shifts suggest how micro-level encounters can contribute to systemic transformation by influencing how change is interpreted, negotiated and enacted.

The design lens also foregrounds the ethical responsibilities designers carry when shaping participatory encounters and imaginative horizons. Future research could develop follow-up approaches to examine how participants' perceptions evolve beyond the duration of design activities and how such refractive encounters may accumulate to influence longer-term processes of systemic change.

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