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Mukhtar-Landgren, Dalia; von Wirth, Timo; Bertolini, Luca; Torrens, Jonas

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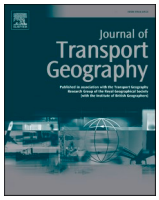

Urban living labs as cracks, not doors: Reimagining experimentation in transport (and beyond)☆

Dalia Mukhtar-Landgren [a,e,f,*], Timo von Wirth [b,g], Luca Bertolini [c], Jonas Torrens [d]

[a] Department of Political Science, Lund University, Box 52, 221 00 Lund, Sweden
[b] Frankfurt University of Applied Sciences, Nibelungenplatz 1, D-60318 Frankfurt am Main, Germany
[c] Faculty of Social and Behavioural Sciences, GPIO: Urban Planning, University of Amsterdam, Spui 21, 1012 WX Amsterdam, the Netherlands
[d] Copernicus Institute of Sustainable Development, Utrecht University, Princetonlaan 8a, 3584 CB Utrecht, the Netherlands
[e] CIRCLE, Lund University, Sweden
[f] The Swedish Knowledge Centre for Collective Mobility, Sweden
[g] Dutch Research Institute for Transitions (DRIFT), Erasmus School for Social and Behavioral Sciences at Erasmus, University Rotterdam, the Netherlands

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ABSTRACT

Urban Living Labs (ULLs) are widely promoted as experimental spaces for urban innovation, particularly in EU policy contexts. Yet their design is often shaped by current institutional logics, EU-funding structures, and sector-specific constraints, especially in transport, a domain marked by technical path dependencies and dominant narratives of efficiency and optimization. These conditions risk narrowing experimentation.

This *Viewpoint* is written within the frame of the special issue *Urban Living Labs and inclusive, accessible and sustainable transport systems*. It critically reflects on the role of ULLs in shaping mobility futures, drawing on Báyò Akómoláfé's metaphor of doors and cracks. In the words of Akómoláfé "doors are anticipated architectural technologies" - they allow movement, but only within the logic of the existing structure. Cracks, by contrast, are unruly and unpredictable; they open towards the unknown. Thinking with Akómoláfé's metaphor, we ask: what remains unseen when experimentation in ULLs becomes an overly programmed or top-down process - when the lab becomes a door that opens in predefined buildings and structures?

This paper reflects on the potential of cracks, and how subtle, disruptive, and often overlooked experiments can emerge beyond what can be seen in formal ULLs. Against this backdrop, we argue for a reformulation of the Urban, the Living, and the Lab that recognizes cities as contested and relational, and centres future experimental interventions in lived experience, care, and refusal. This reframing also calls for new theories of change that may potentially emerge through increasing reflexivity and historical awareness, more attentive listening, and engaging with the unpredictable.

1. Introduction

"If you can get a handle on it, it's probably a door.
I'm wary about doors.
And doorways.
Doors are anticipated architectural technologies. They grant access, they permit exits. What's critical to note about doors is that they maintain the logic of the architectural frame. Doors are systemic agents granting mobility within familiar fields. A building does not lose its integrity with doors. As such, like the solutions we often offer to our most persistent civilizational challenges, doors allow us to shuffle within the already-known, to move the pieces around in the name of innovation, while maintaining the design.
Doors 'behave'.
You know what doesn't 'behave'? Cracks [...]"

(Akómoláfé, 2024)

In the quote above, Báyò Akómoláfé urges us to reconsider how we engage with transformation and the future unknown - not through sanctioned and anticipated paths (doors), but through subtle, disruptive,

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* Corresponding author at: Department of Political Science, Lund University, Box 52, 221 00 Lund, Sweden.
E-mail addresses: dalia.mukhtar-landgren@svet.lu.se (D. Mukhtar-Landgren), vonwirth@fra-uas.de (T. von Wirth), L.Bertolini@uva.nl (L. Bertolini), j.colenladeiatorrens@uu.nl (J. Torrens).

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and often overlooked spaces (cracks). In this *Viewpoint*, we depart from Akómoláfé's metaphors to reflect on Urban Living Labs (ULLs) in the context of mobility and transport. An often-used tool in the EU-governance and funding of urban transitions, ULLs are positioned as experimental formats and spaces for urban innovation and knowledge production, designed with the intention to bring together different actors, such as municipalities, researchers, citizens, and private sector actors, to co-create and test new solutions in real-world settings (Bulkeley et al., 2019; Von Wirth et al., 2019; Marvin et al., 2018). Thinking with Akómoláfé, we are invited to ask: what remains unseen when experimentation in ULLs is programmed from above, as doors in set "architectural frames"? It also invites thinking of potential cracks by drawing on more radical imaginaries, learning from and reconsidering previous and unprogrammed experiments as civic spaces, care infrastructures, or even insurgent practices (cf. Cardullo et al., 2019; Edwards and Bulkeley, 2018). Below, we first reflect on ULLs as doors by describing the house that resides them, before moving to a reflection on experiments - in a broad sense - and their potential as cracks. We conclude by reflecting on a potential reformulation of the Urban, the Living and the Labs of ULL:s.

2. ULLs as doors (what does the house look like?)

A key appeal of Urban Living Labs is their promise to operate beyond or "outside" institutional constraints - testing rules, solutions and collaborations that might otherwise be impossible. In transport, this includes introducing legal exceptions for piloting autonomous vehicles, testing business models for shared mobility services, or street experiments towards car-free neighbourhoods. Yet, even as ULLs promise a partial separation from the context in which they operate, they remain embedded in institutional histories, political struggles and sector-specific dynamics.

Transport is a highly technical domain, shaped by powerful industrial actors and path-dependencies in infrastructure planning, modal hierarchies. Engineering standards, and narratives of efficiency and optimization (Urry, 2004; Geels, 2012; Mattioli et al., 2020). These forces, in the words of Akómoláfé, act as architectural constraints - walls and ceilings - to any door set up to generate or open up towards programmed change in a transport context. Sustainability is frequently based on improving existing systems, e.g. through electrification, automation and platformization where the focus on techno-economic solutions tends to be replicated (van der Meulen et al., 2023; Hawxwell et al., 2024) rather than awakening more radical shifts in thinking about how, why, and for whom mobility is organized (cf. Ryghaug et al., 2023; te Brömmelstroet et al., 2022).

Beyond the transport sector, ULLs are also shaped by their specific organisational configuration and institutional settings. Many European ULLs, particularly those funded by EU funding schemes, operate in the dense institutional infrastructure of "projectified" knowledge production (Torrens and von Wirth, 2021), privileging short-term deliverables, measurable outcomes, replicable models, and buzzwords (co-creation, mission-orientation, smart cities) (Mukhtar-Landgren, 2021). Participants are frequently engaged in fast-paced project cycles that hinder reflection and responsiveness to emerging needs (Erisman et al., 2024). Research on epistemic justice in ULLs shows how path dependencies in both the transport sector and EU project frameworks constrain action, as project members must navigate competing expectations while meeting predefined goals, deliverables, and knowledge hierarchies (Mukhtar-Landgren et al., 2026). There is often a strong emphasis on citizen inclusion, conceptualised in varying terms of co-creation or user-inclusion. Yet while this grammar enables action along particular - mostly eco-modernist and de-politicising directions- it also constrains it - limiting the space for ambiguity, resistance and emergence, while often leading to tokenist participation and limited engagement with justice questions (Luger et al., 2023). These epistemic practices and justifications can also render ULLs unintelligible to the very publics they were intended to serve. Instead, they risk reaffirming an epistemic urban elite bubble among self-selected change agents. Here dominant framings of urban problems circulate with little contestation, reproducing existing knowledge and/or power asymmetries in the urban fabric (cf. Nikolaeva et al., 2019; Nikolaeva and Shakthi, 2026).

Arguing with help of Akómoláfé's metaphor, the lab becomes a door that opens only within the architecture of the funding call, and within the incumbent logics and social practices of transport: innovations are expected to be demonstrable, and solutions scalable and aligned with policy priorities, call texts and other funding logics. As such, the institutional context of projectification narrows the horizon of experimentation, privileging what can be planned and evaluated over what might emerge or unfold. Given these open inquiries to the ULL format, we find good reason to argue that current forms to experiment with sustainable transport futures remain below their actual capabilities.

3. Section 3. ULLs as cracks?

> "[/cracks/] are not 'solutions', not guarantees, not final answers. But something about 'them' marks deterritorializing tensions, and obliquely trace out new realities."
>
> (Akómoláfé, 2024)

If ULLs, as currently practiced, tend to function as *doors*, what could a *crack* entail? What can we learn from cases where experimentation in the transport sector was not programmed? Not managed, but messy? Not scalable, but situated?

Let us explore these questions with the help of an illustrative historical example of a realized mobility transition: the shift of Dutch cities from a car-centric to bicycle-centric mobility planning paradigm in the 1970s. Dutch cities are currently often seen as 'best practices' for others to follow in their quest away from car dominance and towards more sustainable mobility alternatives, and cycling in particular. In several EU-funded research and innovation actions – arranged around 'leader' and follower' cities - this is even an explicit goal. However, Dutch cities were not always bicycle-centric. While the share of the bicycle in urban mobility was comparatively high within Europe it was dramatically declining after World War II, following mass motorization and suburbanization. Many predicted the disappearance of the bicycle from the urban mobility scene. How this trend was reversed is a complex, thought-provoking story.[1] What is important here is to observe phenomena that we would call experiments today, or even ULLs[2] that were central to the transformation. These experiments included free bike sharing, pop-up bike lanes, play streets, street dinners, and other ludic

[1] The function of this example in this commentary is illustrative. For background information see among more: Bertolini, L. (2007). Evolutionary urban transportation planning: an exploration. *Environment and Planning A*, *39*(8), 1998–2019. Oldenziel, R., Emanuel, M., de la Bruhèze, A. A. A., & Veraart, F. (2016). *Cycling cities: The European experience: Hundred years of policy and practice*. Eindhoven: Foundation for the History of Technology. de Boer, M. H. M., & Caprotti, F. (2017). Getting Londoners on two wheels: A comparative approach analysing London's potential pathways to a cycling transition. Sustainable Cities and Society, 32, 613–626; de Lange, M., & Feddes, F. (2019). Bike city Amsterdam: how Amsterdam became the cycling capital of the world. Amsterdam: Nieuw Amsterdam; Bruno, M., Dekker, H. J., & Lemos, L. L. (2021). Mobility protests in the Netherlands of the 1970s: Activism, innovation, and transitions. Environmental innovation and societal transitions, 40, 521–535.

[2] **Note**: Scholars offer different definitions for the distinction and/or overlap between the concepts of Urban Living Labs and Urban Experiments. In this perspective, we consider ULL as experimental formats themselves that are spatially embedded, designed with the intention to bring together different actors to locally co-create, test and learn about urban innovation. This conceptualization still allows ULL to also serve as the institutional context in which further temporary and reversible interventions (e.g. a certain type of street experiment) can be planned and conducted.

and more confrontational actions. At the beginning, they were by no means programmed. Most professionals, policymakers, and politicians, in all earnest, believed that the bicycle had no future. Only later did these experiments start to be incorporated into the policies of the most progressive municipalities, as a way to explore 'for-real' alternative designs and regulations for city streets, together with alternative mobility options, several of which eventually consolidated and became the new norm. In this latter phase, the set-up is reminiscent of what we call ULLs today. This process of material and institutional change did however not happen in a political vacuum. Instead, they were propelled by intense political struggles, relying on a variety of means: mass demonstrations, surprise street occupations, political party lobbying, citizen science initiatives, and more. It all began in civil society, and only later did it enter city councils and the national government. It is this messy, conflictual, unruly whole – where struggles for mobility both fueled in and were fueled by broader struggles for the 'right to the city' - that in the end led to an urban mobility paradigm shift and the emergence of what we now consider a 'best practice'.

Shifting to current examples of European cities where a mobility transition is ongoing - think about the likes of Brussels, Barcelona, or London (Kębłowski et al., 2019; Zografos et al., 2020; VanHoose et al., 2025) – we see a similar, 'messy' mixture of ingredients and processes. And the same applies to examples outside of Europe, including Bogota (McGuirk, 2014), or New York (Sadik-Khan and Solomonow, 2017).

What these examples suggest is twofold. First, experiments 'that matter' might be of different sorts, sanctioned and unsanctioned, planned and emergent. They might start informally, and only later be formalized, and feed into policy change. Second, driving this process, from contestation of the status quo to experimentation with alternatives, to material and institutional change, is political pressure from civic society and from lived urban experiences.

Perhaps this is how cracks might appear, how they might become doors, and in the process might change the whole architecture of an edifice?

Beyond the suggestion, these examples point to a broader need: to make explicit – and thus testable, disputable and improvable - the theory of change behind mobility and urban experimentation. How might we learn from present and historical examples, also beyond the global North, to develop more grounded and plural theories of change? This invites us to see experiments as parts of longer and uneven trajectories, where cracks have been openings through which alternative futures may begin to take shape. Doing so would not only advance theoretical understanding of change and mobility, but also offer critical insights for experimental approaches that aspire to be truly transformational (see for an application to the case of street experiments Grandel and Berger, 2025).

4. Urban living labs as cracks, not doors: bringing the urban, the living, and the lab back in

In the context of Urban Living Labs, the illustration above invites a radical reorientation, including seeing experimentation where it is not labelled as such (Savini and Bertolini, 2019). In this concluding section, we propose ways for critically reclaiming ULLs radical potential, using the three concepts Urban, Living, and Laboratory.

4.1. Bringing the urban back in?

While Urban Living Labs (ULLs) are often framed as context-sensitive and place-based, the prevailing and paradoxical emphasis on scalability, replicability, and spatial exceptionalism risks reducing the "urban" to a neutral container for innovation. This framing overlooks the complex, contested, and deeply political nature of urban space (Karvonen et al., 2014; Evans et al., 2016). We suggest that bringing back the "urban" requires acknowledging the uneven geographies of power, infrastructure, and access that structure urban life. Cities are layered with histories of exclusion and marginalization, but also of resistance, adaptation, and resilience. Understanding these histories of the socio-spatial fabric helps us understand what shapes who gets to participate in experimentation, whose knowledge counts, and who benefits from innovation.

Moreover, the notion of ULLs as exceptional or liminal spaces – operating outside the constraints of "business as usual" - raises critical questions: What exactly are these labs being protected from and at what cost? Which actors are actually being protected within them, drawing which (invisible) socio-spatial boundaries within the urban? We contend that if ULLs are shielded from the messiness of urban politics and the contention their ideas provoke, they risk reproducing the very inequalities they claim to address, or delivering generic solutions that fail to connect with the place. What if we don't think of ULLs as protected places of innovation, but as democratically legitimized, agonistic spaces of contested emergence? This sits uncomfortably with persistent, modernist understandings of transport planning by measures of control, efficiency and risk avoidance, and yet, it seems essential if a transformation of the mobility system is what we aim for.

Re-centering the urban also means rethinking domains like mobility and transport, not as technical systems to be optimized, but as social infrastructures embedded in everyday life. It means recognizing how movement through the city is shaped by urbanites' lived realities, and how efforts to transform mobility are deeply intertwined with efforts to transform other dimensions of urban life: from housing to public space, from work to leisure, from nature to communality.

4.2. Bringing the living back in?

In many ULLs, the "living" is often reduced to stakeholder engagement or user participation. Learning to see the living in new ways (Andreotti and de Souza, 2008) also entails moving beyond the language of "users" and processes of consultation, data extraction, or tokenism, and instead recognize people as situated, sensing, and political beings. It is to see cities not as systems to be optimized, but as ecologies of care and conflict, where human and more-than-human lives are entangled (cf. Tsing et al., 2017). This shift invites us to center practices that are often overlooked in innovation discourse - repair, maintenance, regeneration, mutual aid, and the quiet labour of keeping things going (Papadopoulos et al., 2024; Puig De La Bellacasa, 2017). In transport, it is shaped by the everyday experiences of mobility and immobility, by interdependencies and vulnerabilities, and by the rhythms of care, maintenance, conflict, and cohabitation, also beyond the human (Nikolaeva et al., 2019).

Living labs also means making space for refusal and unlearning - for saying no to extractive data practices, to technocratic planning, and to the relentless pressure to innovate. In this sense, experimentation is not only about disruption or novelty, but about dwelling in uncertainty, protecting space for the not-yet-articulated, and "staying with the trouble" (Haraway, 2020). It is about recognizing that cracks in the system may not lead to scalable solutions, but to moments of resistance, care, and possibility. In this also lies the potential of reawakening trust in democratic processes. Reclaiming the "living" requires reimagining ULLs not just as sites of co-creation, but as political arenas where epistemic, institutional, and affective tensions are negotiated, and where individual and collective self-efficacy can become experienced, which, in turn, builds a new fundament of trust into local institutions.

4.3. Bringing laboratories back in?

The idea of the city as a laboratory is not new. In the 1920s, Robert Park and the Chicago School described "the city as a social laboratory" (Park, 1929). Viewing the city *itself* as a living organism, constantly evolving, their research instead focused on observing cities to understand how they shaped both individuals and social life (Park and Burgess, 1929; Wirth, 1938). In contrast, researchers and other actors in ULLs approach urban environments not as curious observers, but as

active co-creators of urban futures. While the term “lab” still evokes *exploration*, current EU-based ULLs' funding structure, with its emphasis on deliverables and scalable results, aligns knowledge production more to a growing audit-driven and policy-aligned knowledge paradigm. Here focus tends to be placed on producing transferable best practices, which risks downplaying open inquisitiveness.

Bringing the laboratory back in means reclaiming urban labs as a space of curiosity and epistemic humility, where the goal is to both listen and explore. This relies on researchers being willing to call out the misappropriation of labels — for instance, when conventional projects are branded as ‘experimental’ or when top-down programming is disguised with tokenistic participation. Here, other forms of knowledge are needed, resisting the pressure to produce scalable solutions and instead cultivating conditions for learning, unlearning, and reimagining - which would also require shifts in the prevailing funding patterns. Yet, learning from others and the importance of scientific knowledge should not be discarded altogether (which would risk reproducing narratives of anti-scientific sentiment and populist epistemology), instead, relating to the notion of the “laboratory” we propose a shift in emphasis from scalability to translatability. Learning through local and translocal translations also calls for recognizing the necessity of an adaptation and appropriation process that takes the urban, the human and more-than-human, as well as local professional knowledge and experiences into account when learning from others; recognizing that nothing travels without changing (cf. Latour, 1986; Czarniawska and Sevón, 2005).

Instead of seeking replicability, labs might embrace the hyper-local, the ephemeral, the context-specific patterns of mobility - and develop a foundational curiosity to ongoing non-programmed experiments that happen in cities daily. This curiosity should expand beyond the contexts sanctioned by current EU programs, reaching out beyond Europe (think about the experiences of ‘radical cities’ in Latin America: McGuirk, 2014) and beyond the present or recent past (think about the fundamental shifts in urban development and planning paradigms during the 1970s). This also requires reconsidering the centrality of large, network-heavy collaborations which prioritise transnational coordination over intensive place-based collaborations, and privilege large multi-case comparisons over other forms of relational comparison (e.g. Ward, 2010). And it may also require alternative funding models that allow for deep and patient engagement with specific places and their realities.

We revisit the words by Akómoláfé (2024) to close this perspective. Being mindful of cracks, rather than persistently attempting to construct “better” doors, directs attention to the quality and emergence of such cracks in the transport sector. Being mobile as an inherently human condition in late modernity challenges us to rethink the very purpose of experimentation. It asks us to move beyond the lab as a site of controlled testing, and towards the lab as a site of encounter - where different worlds meet, clash, and co-compose, yet not in a planned way. It invites us to see mobility not just as movement through space, but as a relational, ethical, and political practice.

CRediT authorship contribution statement

Dalia Mukhtar-Landgren: Writing – original draft, Conceptualization. **Timo von Wirth:** Writing – original draft, Conceptualization. **Luca Bertolini:** Writing – original draft, Conceptualization. **Jonas Torrens:** Writing – original draft, Conceptualization.

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Declaration of competing interest

None.

Data availability

No data was used for the research described in the article.

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