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Bulkeley, Harriet; Coenen, Lars; Frantzeskaki, Niki; Hartmann, Christian; Kronsell, Annica; Mai, Lindsay; Marvin, Simon; McCormick, Kes; van Steenberg, Frank; Voytenko Palgan, Yuliya

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LUND UNIVERSITY

PO Box 117  
221 00 Lund  
+46 46-222 00 00

# Urban living labs: governing urban sustainability transitions

Harriet Bulkeley<sup>1</sup>, Lars Coenen<sup>2,8</sup>, Niki Frantzeskaki<sup>3</sup>,  
Christian Hartmann<sup>4</sup>, Annica Kronsell<sup>5</sup>, Lindsay Mai<sup>1</sup>,  
Simon Marvin<sup>6</sup>, Kes McCormick<sup>7</sup>, Frank van Steenbergen<sup>3</sup> and  
Yuliya Voytenko Palgan<sup>7</sup>



Urban Living Labs (ULL) are advanced as an explicit form of intervention delivering sustainability goals for cities. Established at the boundaries between research, innovation and policy, ULL are intended to design, demonstrate and learn about the effects of urban interventions in real time. While rapidly growing as an empirical phenomenon, our understanding of the nature and purpose of ULL is still evolving. While much of the existing literature draws attention to the aims and workings of ULL, there have to date been fewer critical accounts that seek to understand their purpose and implications. In this paper, we suggest that transition studies and the literature on urban governance offer important insights that can enable us to address this gap.

## Addresses

- <sup>1</sup> Department of Geography, Durham University, United Kingdom  
<sup>2</sup> Centre for Innovation, Research and Competence in the Learning Economy (CIRCLE), Lund University, Sweden  
<sup>3</sup> Dutch Research Institute for Transitions (DRIFT), Erasmus University Rotterdam, Netherlands  
<sup>4</sup> Joanneum Research, Austria  
<sup>5</sup> Department of Political Science, Lund University, Sweden  
<sup>6</sup> Urban Institute, Sheffield University, United Kingdom  
<sup>7</sup> International Institute for Industrial Environmental Economics (IIIEE), Lund University, Sweden  
<sup>8</sup> MSSI, Melbourne University, Australia

Corresponding author: McCormick, Kes ([kes.mccormick@iiiee.lu.se](mailto:kes.mccormick@iiiee.lu.se))

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## Introduction

Urban Living Labs (ULL) are being advanced as an explicit form of intervention capable of delivering

sustainability goals for cities. ULL can be broadly conceived as forums ‘for innovation, applied to the development of new products, systems, services, and processes, employing working methods to integrate people into the entire development process as users and co-creators, to explore, examine, experiment, test and evaluate new ideas, scenarios, processes, systems, concepts and creative solutions in complex and real contexts’ [1]. For those designing and implementing ULL, they are seen as a means through which to set up demonstrations and to trial different kinds of intervention in the city, from relatively simple technical innovations to more complex or integrated measures designed to contribute to urban social and economic development and wider goals of sustainability. They are purposefully intended to bring together multiple actors that seek to intervene in order to address contemporary urban challenges and foster learning through forms of open and engaged experimentation.

What makes ULL distinct is their focus on knowledge and learning as a means through which such interventions can be successfully achieved. ULL aim at co-creation and empowerment of multiple stakeholders in co-shaping of the experimental approach in a ‘triple’ or ‘quadruple’ helix mode of bringing science, policy, business and civil society together [2,3] and being open and participatory [4]. ULL are also marked by their explicit place-based focus, whether this be concerned with a specific urban site, district or economy. ULL seek to deliver innovative and transformative improvements across the urban milieu, from buildings to green space, transport to energy systems, local food to sustainable forms of consumption [5]. They work within and across urban socio-technical and socio-ecological systems in order to mobilise change. In short, ULL are sites devised to design, test and learn from innovation in real time in order to respond to particular societal, economic and environmental issues in a given urban place [6].

While rapidly growing as an empirical phenomenon, our understanding of the nature and purpose of ULL is still evolving. There are a growing number of accounts of ULL derived from actors who have been involved in establishing ULL or in undertaking analysis of how they have been established and the extent to which they are fulfilling their intended purposes of testing, learning and

developing innovation. Given the early stages of the development of ULL, this material tends to primarily be in the grey literature with fewer academic papers having been written to date (though for recent examples see: Refs. [7<sup>\*</sup>,8<sup>\*</sup>]). There have been fewer perspectives to date that have taken a more critical approach to the analysis of ULL, seeking to investigate the emergence and embedding of this phenomenon within broader logics of urban development and examining their consequences and implications (for a recent and comprehensive exception, see: Ref. [9<sup>\*</sup>]).

In this paper, we seek to address this gap by positioning ULL as part of a broader shift in the nature of urban governance in which forms of innovation and experimentation are being marshalled as a means through which to govern particular (urban) conditions [10]. We suggest that ULL are not a stand-alone set of interventions, but part of a wider ‘politics of experimentation’ through which the governing of urban sustainability is increasingly taking place [11,9<sup>\*</sup>,12,4,13–15]. While they may be distinct in terms of their concern with the use of data and real-time knowledge in order to generate insight and traction for the forms of intervention they are undertaking, here our focus is not on their capacities to develop learning *per se* but rather with how they contribute to the emergent experimental approach to responding to sustainability challenges at the urban level. This raises the question if and how such an experimental approach can create an impact beyond their immediate domain and induce transitions across urban socio-technical and socio-ecological systems. A crucial challenge in this regard is how loosely coupled system elements (new technologies, institutions, markets, actor and network constellations) evolve and align into more stable configurations that would be able to replace and transform a current (unsustainable) system.

It has been within the fields of transitions theory and urban governance that the nature and dynamics of urban experimentation have been most closely studied to date. We draw on these broad bodies of work to develop a novel framework to critically understand the existing role and future potential of ULL as part of this broad phenomenon of urban experimentation. This paper therefore focuses on the core concerns within these two approaches, the common ground they share, and the important tensions. Through this process we develop a new perspective that can identify a shared set of concepts and issues to inform the investigation and analysis of ULL in different urban contexts and local conditions.

### **Understanding ULL as innovation governance and governance innovation**

As a means of intervening in the urban arena to address particular sustainability challenges, ULL constitute a particular form of governance innovation. Understanding the means through which they are designed, implemented

and take effect can therefore usefully draw on the tradition of innovation studies and socio-technical transitions. This work has examined the role of niches that provide experimentation space for the development, testing and failure of novel innovations in ‘real’ contexts, where new networks can be supported and sustained [16]. These innovations struggle against stable regimes through which existing socio-technical systems are stabilised due to the processes of lock-in, path dependency and ‘entrapment’ [17,18]. This work suggests that what is critical to the governance potential of ULL are the ways in which they constitute, and are constituted by, social networks, expectations or visions, and forms of learning. The configuration or design of niche experiments provides a space in which new ideas, ways of viewing the future, partnerships, socio-material configurations and so on can be trialled in a ‘protected’ space, affording the actors involved the potential to go beyond business as usual and prove the potential of alternatives.

In the case of ULL, as discussed above, it is the focus on the creation of a new learning arena that marks out this particular type of governance innovation from other kinds of urban experimentation. Co-created by research organisations, public institutions, the private sector and community actors in what is often referred to as a ‘triple’ or ‘quadruple’ helix mode [19], ULL are seen as a means through which to gain experience, demonstrate, and test ideas, and co-develop new skills and actionable knowledge that is explicitly captured and used to inform the process of creating urban sustainability [20<sup>\*</sup>,21<sup>\*</sup>,8<sup>\*</sup>,5<sup>\*</sup>]. In some contexts, such as the projects under the JPI Urban Europe programme, the development of ULL draws explicitly on the learning gained from approaches to transition management in which research teams, together with stakeholders, are actively engaged in fostering the ULL and leading a process of visioning and learning through which transitions in urban practice, policies and planning can take place. Elsewhere, the nature and extent of learning in ULL varies from those ULL which are highly-instrumented and seek to collect data in real-time, for example through ‘smart’ applications and data management and control systems, to those which regard learning as a collective and reflective practice, for example through ongoing forms of community and stakeholder engagement and consultation. The different practices which animate ULL are critical in shaping how these interventions in turn are able to gain traction and realise their objectives for governing the city.

Beyond questions of the social networks and visions that constitute how ULL are configured and the practices of learning through which they are enacted, central to the analysis of niche innovations is a concern with their potential to transform wider systems. Smith and Raven [16] argue that alongside processes of protection, niches and experiments foster different forms of empowerment

— means through which they are able to either ‘fit and conform’ or ‘stretch and reform’ existing regimes. Including a geographical perspective, which seeks to understand how the emergence of ULL under particular urban conditions is made possible and in turn changes the conditions of possibility for urban places, is critical for developing our understanding of the processes through which ULL are (and are not) able to leverage change within and across the urban arena [22]. In short, integrating insights from the growing body of work on the geographies of niche innovations and transitions can contribute to our understanding of the processes through which ULL come to gain momentum, and in turn the ways in which this shapes their transformative potential.

Transition studies perspectives therefore provide a great deal of insight into how ULL, as a form of niche innovation or as a process through which transition management is deployed, are governed. It signals the importance of the visions, knowledge, skills and social networks designed into ULL, the practices through which learning is enabled, and the processes through which broader transformation is sought. However, it is critical that ULL are not considered only in their own terms – as a form of intervention that may be more or less suited to specific contexts – but also in terms of their role as part of the wider phenomenon of a shift in the governance of sustainability. It is to these debates that we now turn.

### Governing the city through ULL

If governing urban sustainability used to be a matter of the development of urban plans and strategy, often informed by processes of environmental assessment and public consultation, ULL in common with other forms of experimentation involve a more interventionist, incremental and ‘learning by doing’ governing approach in which urban sustainability is emergent rather than pre-given. Seeing ULL not only as discrete arenas for research and development, but as part of a broader shift in the ways in which society responds to urban sustainability challenges requires a more explicit engagement with the ways in which they form part of the shifting governance landscape. Within the transitions studies field, the institutional and actor-orientation of the governance debate have backgrounded a set of key questions — how, by whom and with what consequences does governing take place?

We suggest that in seeking to understand the nature and dynamics of governing urban transitions through ULL, this emphasis on analysing governance as an institutional configuration would benefit from an additional perspective that deals explicitly with governing — the means through which power and agency are orchestrated and take effect (see also Ref. [23] for a similar argument in relation to niche governance). Such a combined approach enables us to complement the identification of distinct

spatial or temporal forms of governance with an examination of the means through which governing shapes societal transformation. In doing so, it helps to specify and unpack the causal mechanisms in these institutional configurations through which governing effectively takes place and through which we might seek both explanation and leverage to effect greater transformative potential (*i. e.*, how and why such institutions effect the governing of innovation). Such an approach asks for a more vigorous interrogation of the ways in which power and agency are orchestrated to produce particular outcomes (and foreclose others). Such debates are of course long running in the social sciences and subject to sustained debate.

A central challenge is to provide an account that is able to deal with the stability of regimes and the dynamics of innovation. Initial attempts that have emphasised the structural power of regime formations and the agent-based power of innovations appear to have come full circle. Emphasising power as a property of individual agents neglects the structuring power of regimes. Focusing on power as a matter of interest neglects the long history of work in political science that has demonstrated the importance of ideas, values, and norms in shaping the dynamics of power. A human-centred vision of power (and agency) neglects the significant work of scholars in urban political ecology, actor-network theory and new materialism (much of which is concerned with questions of the urban and of infrastructure) in demonstrating the socio-material means through which power and agency are co-constituted and the importance of such perspectives in their emphasis on the political economies of infrastructure and metabolic flows (*e.g.*, Refs. [11,24–29]).

One means of addressing this conceptual dilemma is to actively engage with the notion that power is a distributed property, such that it neither resides with individual agents nor is structurally determined [30]. Governing in such accounts is accomplished not by individual institutions, but is an active, dynamic and provisional process that is continually being sought through ‘programmes’ or ‘projects’ that seek to intervene in the existing social (and material) order to achieve particular ends [31]. From these perspectives, power cannot be conceived as a held resource or property of individual actors. It is instead a relational force that emerges through the juncture of different configurations of social (and material) entities (see also Ref. [32]).

Agents and institutions are central to such an account of power. Yet their nature, capacities and effects are not pre-given but rather generated through the socio-material conditions within which power is realised. Governing from such a perspective takes place through ‘strategically constructed concrete programmes of action’ by which the means of governing and the actors which enact them are themselves constituted [33]. From this perspective,

particular projects of action – in our case ULL – can be seen as a manifestation of the ways in which actors seek to constitute not only the world around them, but also what it means to govern. The design of ULL is then central to their capacities as a calculated form of intervention. The nature and effect of such interventions are constrained by the socio-material configurations within which they intervene and the power they generate in their assemblage, whether it be of a particular modality (*e.g.*, authority, domination, seduction, after Allen [34]) or seen to have particular kinds of potential (*e.g.*, innovative, transformative, after Avelino [35]). This in turn suggests that the ways in which ULL are conducted – the techniques of data gathering, the forms of participation – are a critical means through which the governing of the urban milieu takes place. In short, the practices commonly associated with ULL – of partnership, participation, learning, data mining – are not neutral mechanisms but central to the ways in which governing is achieved and in shaping the possibilities for transformative processes.

## Conclusion

Conceiving of ULL as particular governance projects provides one means through which to conceptualise their role in transformative change. Taken together, this reading of the literature on transitions, power and governance suggests that there is considerable scope to work with a notion of the governance of transitions that pays attention to the dynamic qualities of power as a set of capacities that are constituted through the formation of calculated interventions or projects designed to intervene in the city in relation to particular goals which have some degree of authority and legitimacy. Taking a view of power as a relational property and manifest in the ways in which capacity is exercised suggests that investigating how governing takes place through ULL requires that we move beyond understanding them only as a means through which new kinds of research, development and learning are being orchestrated towards an assessment of how they serve to (re)configure socio-material conditions and mobilise agency and resources.

We suggest that such an approach requires the examination of how capacity to govern is exercised in different arenas. Such an analysis involves attending not only to what might appear to be the inherent capabilities or resources of organisations and institutions (and from such descriptive accounts, reading off their power) but also examining how the ULL intervention serves to configure or reconfigure the capacities, resources and agency of the actors, intermediaries and materialities (*e.g.*, the capacities of particular technologies, ecologies, or material properties of the urban and how they are enrolled into strategic interventions) in particular urban contexts and with what consequent effect. In short, that what ULL are capable of is not only a matter of the institutions and actors involved,

but how their configuration or design realises new kinds of capacities and capabilities.

This in turn shapes the practices that are undertaken within ULL, including the instruments (*e.g.*, policy tools, incentives, consultation deployed) and techniques (*e.g.*, forms of learning, measurement, accountability) used. These practices can both serve to reinforce the configuration of the ULL but also create new junctures and configurations through which the ULL may evolve in its intentions and capacities. The ability for any particular ULL to realize a broader set of transformations beyond the initial site and objectives of intervention relies on a series of processes, including learning, mobilization and translation, which are made more or less possible and feasible by both the design of the initial intervention and the practices to which it gives rise.

From our analysis of the insights given by transition studies and urban governance, we find that these three elements – the design, practices and processes – of ULL are critical in terms of understanding their role in governing urban development and contributing to social and environmental transformation. In this perspective, ULL are doing more than simply fostering learning and innovation, they are part of the ways in which urban responses to sustainability challenges are governed. Viewing ULL as part of the shifting governance landscape, a means through which interventions are increasingly pursued in order to realize urban objectives, does not mean that they are all equally successful in realizing their aims. Understanding how and why some ULL are able to take effect and others are not requires that we delve into these dynamics of power and agency to grapple with how the governing of the city is taking place. Using this perspective, we suggest that further detailed empirical work is required to explore the extent to which these diverse responses achieve their intended impacts and the unintended consequences these might produce in shaping urban sustainability transitions.

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