

# CityLab reflections and evolutions: nurturing knowledge and learning for urban sustainability through co-production experimentation

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Applied research has evolved to play an important role in understanding and reorienting relationships between different knowledge partnerships in urban sustainability. This paper reflects on experiences from the global South on knowledge co-production experiments through 'CityLabs', which are forums for bringing together different knowledge brokers (particularly government and academia) to co-produce policy-relevant urban knowledge. Each CityLab experimented with different configurations to generate knowledge relevant for addressing urban sustainability challenges. This paper reflects on these experiences and identifies emerging common principles. These include: deliberate formulation of safe spaces, in which to engage, willingness for flexibility around the direction, focus and outputs, and carefully fostering trust and mutual understanding among participants. Urban experimentation, and CityLabs in particular, provide real opportunities for facilitating learning, reframing issues and shifting practices around urban sustainability between government and the academy.

## Addresses

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## Introduction

The urban development trajectory is critical in determining sustainable development globally [1–3]. Urban areas influence not only their immediate geographical footprint, but also the global resource flows that support their economies and growing populations. The global urbanisation trend is particularly evident in Africa and Asia, where the rate and scale of urban growth outstrip previous experience globally [4,5]. In Africa, complex urban challenges resulting from rapid urban growth are compounded by local governments that typically have limited capacity and weak governance.

A number of urban experiments have emerged globally to foster alternative responses to urban complexity and to achieve urban sustainability in the context of rapid urbanisation. One set of approaches include endeavours to foster new knowledge responses, drawing on transdisciplinary research and knowledge co-production. CityLabs, as described in this paper, are a global South example of urban experimentation with knowledge co-production. This paper reflects on practice to begin to characterise the key features and principles of CityLabs, and urban knowledge co-production more generally.

Cities are sites of complex, often multi-level, governance, and home to a range of actors with diverse knowledge and opinions. Effective urban decision-making depends on spatially and temporally relevant insights across a range of socio-technical contexts [6] that are sensitively contextualised and integrated [7]. Analysis from Southern cities is critical for guiding sustainability transitions where urban development, poverty and climate change impacts are concentrated, and governance systems are often weak [3,8]. In these comparatively under researched areas, building knowledge, identifying opportunities for learning and avoiding un-nuanced 'best practice' approaches is critical [9]. CityLabs are one example of experimentation with knowledge co-production across government, academia and other knowledge brokers that can develop new framings and knowledge that is required for urban sustainability in the South.

Experimentation in research and practice is 'a key tool to open up new political spaces' for governing sustainability challenges [10,11\*]. 'Urban experimentation' describes a

range of orientations and approaches, which seek to understand how phenomena ‘can be manipulated and observed’ at the urban scale [12]. Experiments seek to design, test and evaluate methods and approaches, with the deliberate intention of building knowledge and opportunities for learning and innovation [3]. Karvonen and van Heur emphasise the importance of ‘situatedness, change-orientation and contingency’ in urban experimentation [13]. Experiments are often founded on the premise that a combination of academic and practice-based knowledge is better positioned to provide policy responses to complex urban sustainability challenges than either individually [14,15]. Many experiments are challenge-oriented and draw on transdisciplinary, collaborative methods that strengthen knowledge and learning between decision-makers, academia and other actors [16]. The ‘co-production’ and ‘co-design’ of knowledge have emerged as key approaches in global change and sustainability work [17,18]. Given the increasing importance of cities, many of these experiments in co-producing knowledge have focused on addressing issues of urban sustainability [1–3,14,15,16,17,19]. This paper reflects on the application of a particular mode of urban research experimentation – the CityLab.

CityLabs are forums deliberately established to co-produce policy relevant knowledge among relevant knowledge brokers in government and academia. The metaphorical notion of a laboratory denotes that CityLabs typically constrain their focus to a specific city, issue or timeframe while exploring, and sometimes producing, different types of knowledge to generate relevant insights. The CityLabs described in this paper evolved between three independent, applied research institutes, and across geographical contexts including South Africa, Tanzania and the United Kingdom. They all focus on sustainability challenges, including climate change, health, green infrastructure and urbanisation. CityLabs engage around the challenging transitions required in socio-technical systems to enable urban sustainability. Unlike other similar forums, such as ‘living labs’, which might function by developing and introducing new technology, a distinguishing focus of CityLabs is knowledge co-production to enable different levels of government to address urban sustainability challenges. CityLabs are premised on creating shared understanding across a range of actors in safe or neutral spaces that enable dialogue between knowledge brokers in government, academia and beyond. While they share common features, there is no fully prescriptive model for the organisation of a CityLab, and they reflect their respective contexts.

#### **Developing collaborative spaces for knowledge co-production and learning**

Contemporary research highlights the need to understand and bolster urban knowledge systems, and to ensure that they provide opportunities for collaborative input to

support action [20,21,22]. Active intermediation that can bring together the ‘what’ and ‘how’ of knowledge is critical for achieving just, sustainable urban futures [23]. Furthermore, bringing different knowledge brokers together to bridge the spaces between knowledge generation and use can facilitate knowledge co-production and develop solutions to issues that cannot be addressed separately [19,24]. This paper engages specifically with knowledge partnerships between academia and government, and their role in ‘increasing the quality and contextual relevance of policy research and in strengthening the translation of academic research into policy’ [25].

Knowledge about co-production advances often occurs faster than the theorisation thereof [26]. Advances are characterised by ‘learning by doing’ [27] to create ‘Mode 2’ knowledge through applied and transdisciplinary work [28,29]. Some valuable theoretical insights exist around ‘living labs’, ‘future labs’, ‘urban labs’, ‘urban living labs’ and so on. [30,31]. However, these have largely been led by academics in the global North (e.g. in Refs. [11,23,32,33]). The CityLabs described in this paper are based on urban experimentation in the South [15], which can provide critical insights to inform global debate and practice. Insights from these experiments allude to a need for new (less ‘traditional’) ways of engaging on urban topics, and experimentation is central to understanding how new practices might be (further) developed to integrate multiple knowledges between academia and government [17].

#### *Urban co-production experimentation (for sustainability)*

Global bodies, providing insights supporting global governance agendas (e.g. in Refs. [34–36,5]), highlight a need for transformative change to address pressing sustainability challenges. Literature emphasises the importance of urban experimentation in catalysing change and its specific potential for promoting institutional change towards sustainability [37]. Fuenfschilling *et al.* [1], note that experiments may sow the seeds that “lead to a fundamental transformation of a system . . . into a new, potentially more sustainable socio-technical configuration that, if diffused more broadly, will radically alter the existing system” [1,37].

Social and institutional progress towards sustainability inevitably require changes in individual behaviour and at all levels of governance [38,39]. Urban laboratories draw together ‘processes of change and the emergence of new practices and concepts, connecting future visions of cities to the ‘politics and practices of hope’ [13], and are premised on claims that ‘experimentation goes hand in hand with creativity and innovation’ [40]. However, there is limited evidence that draws together these experiments with knowledge and learning about urban sustainability transitions [11,41], or on the role of partnerships in enhancing knowledge co-production [42].

### *CityLabs: transdisciplinary knowledge, co-production and learning*

CityLabs are a form of transdisciplinarity, focusing on complex urban issues where a range of actors engage and create spaces for learning and knowledge co-production, to generate policy-relevant research with academic credibility [43,44]. Input from government officials<sup>5</sup> and academics is critical, as collaboratively, officials provide insight into policy and implementation challenges, while academics generate data and bring analytical expertise to inform policy processes. These processes also help ground academic debates in practice. The context of the particular debate is important in shaping the form of CityLabs in different places and in relation to different urban sustainability challenges. Although each CityLab is configured differently, they are all based on the assumption that shared understandings and safe spaces are important for knowledge co-production. At its core, a CityLab is a platform that brings a range of actors together to 'share and co-produce knowledge' around a specific topic by using the city as a laboratory [45].

### **Approach**

This paper was developed through a mixed-methods approach, combining autoethnography and literature review. The authors have all been involved in the development and implementation of CityLabs [Warren Smit and Pippin Anderson (CityLab Programme in Cape Town), Zarina Patel (Knowledge Transfer Programme in Cape Town), Christina Culwick (Green Infrastructure CityLab); Carla-Leanne Washbourne (Green Infrastructure CityLab for London); Anton Cartwright (Tanzanian Urbanisation Laboratory)]. These respective experiences have been collated in response to framing questions relevant to the remit of this special issue that is, in the context of 'Collaborative work, innovation and far-reaching approaches to multiple sustainability challenges':

- 1 *How did the CityLabs contribute to developing a collective understanding across different stakeholders?*
- 2 *How did the CityLabs create a neutral or safe space to enable real engagement and reflection by those involved?*
- 3 *How did experimentation play a role in the CityLab?*

Responses were collectively discussed in plenary and summarised, ultimately generating the headings and subheadings of the paper that follow based on the key emerging areas of: 'Urban co-production experimentation (for sustainability)', 'Transdisciplinary knowledge, co-production and learning' and 'Outcomes, outputs and impacts'.

A literature review was completed, with searches based on these key terms and areas of interest. The corpus from

which the paper was developed not only includes academic publications, but also draws upon a range of reports and other publicly available materials, which provide further context to the individual CityLabs described.

### **Discussion: CityLabs for sustainability**

The 'CityLab' formulation discussed in this paper has its roots in the African Centre for Cities (ACC), at the University of Cape Town, South Africa. The ACC ran a series of CityLabs from 2008 that brought together academics, government officials and other stakeholders to co-produce policy-relevant knowledge on the key urban challenges facing Cape Town. The CityLabs brought together different types of knowledge through seminar series and joint publications that reflect a range of experiences and views from academics, officials and civil society. This helped build 'communities of knowledge and practice'. Most of the CityLabs also involved one or more of the following activities: undertaking collaborative research; co-producing new policies with policy makers; and co-designing and implementing innovative projects. The CityLab topics were identified through engagement with the two main government partners (the City of Cape Town and the Western Cape Provincial Government). In all, there were nine CityLabs, two of them focusing on particular key geographic areas and seven with a thematic focus. Many of the initial ACC CityLabs focused on sustainability issues (for example, the Climate Change CityLab, Urban Ecology CityLab and Sustainable Human Settlements CityLab), and inspired the adoption and evolution of the model in other contexts.

Following the initial CityLab series, the ACC further developed the model through an urbanisation laboratory in Tanzania (TULab) that applied the same approach to issues of sustainability at a national scale, and through the Mistra Urban Futures Knowledge Transfer Programme (KTP), an exchange partnership between the City of Cape Town and ACC, which demonstrated how deeper university-city knowledge and learning can be fostered through temporarily embedding academics into the city and officials in the academy [26]. The Gauteng City-Region Observatory (GCRO), in Johannesburg, South Africa, adopted the CityLab approach in 2014 to explore and develop knowledge around implementing a green infrastructure approach in Gauteng. A CityLab is currently being explored at University College London (UCL) for green infrastructure planning and decision-making in London, United Kingdom. [Table 1](#) provides a summary of the CityLabs in the various phases of the model's evolution.

Although the various CityLabs shared the objective of facilitating knowledge co-production among government and academic stakeholders, their respective structures responded to their specific contexts. For example, the Sustainable Human Settlements CityLab in Cape Town,

<sup>5</sup> Officials is used in this paper to refer to government officials, include officials from municipal, provincial and national government levels.

Table 1

Summary of the selected CityLabs reviewed [22<sup>\*\*</sup>,45,46]

Description	Location	Lead organisation	Focus area	Participants	Output/online link
CityLab programme	Cape Town, South Africa	ACC	There were nine CityLabs: central city; Philippi; climate change; urban flooding; urban ecology; healthy cities; sustainable human settlements; safety, violence and inclusion; and public culture.	Academics, officials (from the City of Cape Town and Western Cape Provincial Government), civil society organisations.	Each CityLab had a range of outputs, for example, the Climate Change CityLab co-produced a book on climate change adaptation and mitigation in Cape Town [47]. <a href="https://www.africacentreforcities.net/programme/mistra-urban-futures/citylab/">https://www.africacentreforcities.net/programme/mistra-urban-futures/citylab/</a>
Knowledge Transfer Programme (KTP)	Cape Town, South Africa	ACC and City of Cape Town	A range of topics, including climate change, the green economy and transport.	Academics were embedded in City structures for three years each, with half their time spent working for the City and half doing academic research. City officials on exchange to the University for two months at a time.	<a href="https://www.mistraurbanfutures.org/en/project/knowledge-transfer-programme">https://www.mistraurbanfutures.org/en/project/knowledge-transfer-programme</a>
Green infrastructure CityLab	Gauteng, South Africa	GCRO	Green infrastructure planning and management	Local and provincial government officials, academics, non-government organisation	<a href="http://www.gcro.ac.za/research/project/detail/green-assets-and-infrastructure/">www.gcro.ac.za/research/project/detail/green-assets-and-infrastructure/</a>
Tanzanian Urbanisation Laboratory (TULab)	Tanzania	ACC	Urbanisation megatrends in Tanzania	Epistemic community of urbanists in Tanzania	Tanzanian urbanisation roadmap <a href="http://www.esrftz.org/newsdetail.php?id=232">www.esrftz.org/newsdetail.php?id=232</a>
Green Infrastructure CityLab for London	London, UK	STeAPP, University College London	Green infrastructure planning and decision-making	Local government, academics	– (In development – no online presence yet)

which set out to co-produce a policy (the Living Cape Framework), involved a group of officials from different sectors meeting frequently over a few years. It used a professional facilitator in a few workshops where people brainstormed, prioritised and clustered issues together, and it involved co-writing a policy document that went through dozens of drafts. The Urban Ecology CityLab met on a monthly basis, with each meeting focusing on a different aspect of Cape Town's urban ecology. The meetings included academics, government officials, practitioners and members of the public; however, participants varied significantly between meetings, which reflected who was interested in the different topics [46]. The Climate Change CityLab commissioned and collectively peer reviewed research pieces on climate change impacts and options relevant to Cape Town. The Green Infrastructure CityLab in Gauteng was convened six times over one year, and included a core group of about 15 participants from local and provincial government, academia and non-government organisations. Each CityLab session built on the previous, and focused on various aspects of implementing a green infrastructure approach. The TULab included urban specialists from government, civil society and business. It hosted

quarterly meetings over three years to review research and develop a policy discourse around the opportunities and risks accompanying Tanzania's rapid urbanisation. The community and partnerships that the TULab enabled, represent a complementary resource to the knowledge generated as Tanzania looks to develop its cities in a sustainable manner.

### Process and methodology – the role of experimentation in the CityLab

CityLabs are an example of urban experimentation, where the types of experimentation differ from case to case: bringing together different knowledges or people for the first time, developing new forms and methods of working together, or experimenting with new ideas, policies and ways of looking at issues [46].

#### *Experimenting with bringing different knowledges and people together*

All of the CityLabs created spaces for individuals from academia, government, and in some cases the private sector and civil society, to engage on sustainability-related issues. The process of simply bringing **people with a shared interest into the same space** can support



sustainability transitions, particularly where these people enjoy a degree of influence over urban decision-making. Bringing practitioners, academics and the broader public together in the Urban Ecology CityLab, and addressing the fragmented community of urbanists in the TULab, are two such examples. By creating proximity, a deeper appreciation of the concerns and knowledge perspectives of each partner was established. While some CityLabs had different groups of people attending different sessions, most of the CityLabs had the same core group of participants throughout the CityLab. In these cases, trust among participants is built over time [15].

Providing a **neutral or safe space** is important. The CityLabs were generally held at the respective university, which helped separate the non-academic participants from their everyday work and institutional politics, and created an open space for thinking, debating and engaging. For many officials, CityLabs provided opportunities to get out of their day-to-day 'functional' environments, and allowed a different space in which to reflect and be creative [45]. The venue choice requires a balance between convenience for officials and other stakeholders (increasing participation) and the advantages of an unfamiliar space. In the case of the Philippi CityLab, many of the meetings were held in the area of Philippi to ensure local community groups could attend. However, the selection of space can prove problematic: in one example, a participant in the Urban Ecology CityLab did not wish to speak on the university campus, but was willing to lead a field visit instead [27]. This required a flexible approach and deliberate reflection regarding what spaces would be safe and neutral for different participants [46]. Similarly, in the context of Tanzania's politically contested cities and episodes of authoritarian governance, it was important that the TULab meet outside of government premises.

Facilitating a space where all participants are in equal standing, helped to facilitate real knowledge co-production and learning [14]. In establishing the ACC CityLabs, a particular senior academic was instrumental in establishing the broader CityLab culture regarding **collegiality, respect and generous scholarship**, which proved valuable in building trust among participants [44]. In some of the CityLabs, it was necessary for the facilitator to remind participants that these were 'safe spaces to ask difficult questions' and provide constructive criticism. Some challenges arose from officials' discomfort in accepting perspectives that cast the city in a bad light, or where participants could face statutory penalties for contravening official data [48]. The CityLab's experimental nature required a willingness to be iterative and flexible about its form and direction [26]. Allowing the participants to influence the direction or outcomes of the various CityLabs was critical for enabling real engagement and a sense of ownership among the participants. However, this can be challenging, for example, in the Healthy

Cities CityLab, where participants from different disciplines held very different worldviews, finding agreement on a research methodology was difficult [29].

#### *Experimenting with co-production processes*

A necessary component of co-production is building mutual understanding between different participants [21\*\*]. **Developing shared understanding** (or a more holistic understanding that integrates a range of perspectives), common language and revealing subjectivity are critical for co-production [44]. Participants from different disciplines and sectors use different terminologies for describing things. Much time in the initial CityLab meetings was spent unpacking the basic concepts. For example, defining 'chronic disease', 'walkability', 'sufficient physical activity' and 'food security', or explicitly differentiating between 'green infrastructure' and 'ecological infrastructure'. Shared understandings of operating space and time were also challenging, as academics tended to focus on issues with relevance for a global audience, whereas practitioners are embedded in the local context, both at different working paces and timelines.

Transdisciplinary processes inevitably confront issues around different **worldviews, modes of working** and **each person's subjectivity** [29]. It is critical for participants to be able to share knowledge, learn from each other and to build collective knowledge and understandings, even if individual perspectives remain different. The CityLabs did not require that all differences were reconciled, but created space for them to co-exist, to be surfaced and discussed. A significant danger for effective co-production is perceived or superficial agreement, without deeper shared understanding. In such cases, collective engagement on issues over time can help to surface these misaligned understandings. A key theme that emerged from each of the CityLabs is that understanding each other is more important than developing understanding of concepts. A focus on understanding each other, while retaining individual perspectives, can lead to catalytic spaces of knowledge co-production, innovation and learning. In the Urban Flooding CityLab, an important research component was mapping out different perspectives amongst key stakeholders [49]. Sharing individual experience proved critical for building understanding of different actors and how they work.

#### *Approaches to the problem/solution and knowledge*

Academic institutions are perceived as playing a key role in integrating and validating knowledge [50], and thus can help ensure that different perspectives are taken seriously by other participants [51]. However, in some cases the academic modes of working undermine the ease of non-academics to participate and engage [52]. By design, CityLabs open up opportunities for dialogue [53], knowledge sharing and mutual learning. The deliberate process of integrating different types of knowledge is unusual for

most people and (especially historically) not a default approach [54]. Bringing together people from different disciplines to undertake research collectively, often ended up with methodological innovation/experimentation. In the Healthy Cities CityLab, participants from a wide range of disciplines developed a ‘body mapping’ methodology that deliberately combined qualitative and quantitative methodologies in response to the particular Cape Town context [55,56].

Although most sustainability challenges require multifaceted responses and contribution from multiple sectors and actors, it is common for individuals to believe that they have a holistic understanding of the challenges or solutions. CityLabs were effective at **challenging these perspectives** and particularly perspectives about other actors. The Climate Change CityLab, for example, challenged both the officials’ belief that the City held the ‘solutions’, and the academics’ unduly normative sense of how decision-making, budgets and good governance ought to work. It is important for participants to recognise the partial nature of disciplinary knowledge, and to appreciate how different types of knowledge could complement each other [9,57,58]. Pairing the evidence-based knowledge of city practitioners with the theoretical and methodological bias of academia was effective in providing defensible policy positions and implementation frameworks [44].

#### **Outcomes, outputs and impacts – CityLabs facilitating learning, reframing issues and shifting practices**

A defining feature of the CityLabs is exploring **new ways of thinking and working**. Cities are evolving or living spaces [21<sup>••</sup>], that cannot be ‘stopped’ for the sake of experimentation [59]. CityLabs, where successful, enable the city to experiment with new ideas without unduly jeopardising the daily routines of the ‘living city’ or the livelihoods that depend on them. Thus, learning is iterative and unpredictable, differing in each CityLab. The TULab focused on reframing the urbanisation megatrend as an opportunity rather than a risk. The Sustainable Human Settlements CityLab aimed to shift government thinking and policies radically around human settlements interventions. Other CityLabs resulted in actual physical projects, like the Public Culture CityLab which developed public art projects that required experimentation by artists working in unusual spaces and with unusual objectives. **Changing practices** requires some experimentation with new approaches and thinking outside the current ways of doing. The Green Infrastructure CityLab, for example, inspired an official to experiment with an existing bylaw to facilitate greater influence over new development applications. In many CityLabs, changing practices around learning, knowledge development and collaboration were transformative [60].

A **shared output**, such as an edited book, special issue of a journal, a policy document or a collaborative research

project, provided many of the CityLabs with the necessary focus to build a productive understanding [61]. The process of joint authorship between officials and academics provided the focal point through which the different understandings and knowledges were navigated. In a number of the ACC CityLabs and the KTP, the intention was to jointly author publications and highlight non-academic voices [14], while the act of writing about urban challenges and their responses demanded new theoretical and conceptual clarity from officials [3].

#### **Conclusion**

Urban experimentation, and CityLabs in particular, provide real opportunities for facilitating learning, reframing issues and shifting practices around urban sustainability. This paper emphasises the importance of drawing inspiration from others who are engaged in experimental knowledge co-production and learning to develop nurturing environments for learning and exchange. CityLabs experimented with bringing different knowledges and knowledge brokers together, which required fostering safe spaces. However, trust proved more important than the ‘safeness’ of the space. Although CityLabs create spaces for knowledge co-production and learning, they do not necessarily result in a collective understanding. Rather than building better understanding of the ‘facts’ related to each of the CityLabs, the most transformative areas of knowledge and learning emerged from enhanced understanding of how different actors perceive the issue and their respective modes of working.

CityLabs foster a dynamic relationship between learning and practice, developing knowledge networks and actively addressing sustainability challenges. This not only supports policy and decision-making, which is critical in cities in the South with weak governance systems [3], but it also grounds research in the experiences and practices of government. CityLabs generate knowledge and research partnerships, and can enable a more nuanced theorisation of cities that is not possible through traditional modes of research [62].

It is important to note that the CityLab model is not suited to all contexts or objectives. They require commitment and joint goals, and a willingness to engage and rethink current practices and ways of knowing. However, the CityLabs described here emphasise the real opportunities for supporting and guiding urban sustainability transitions. The CityLab experience demonstrates how effective knowledge co-production can be achieved through bringing different people together into deliberately facilitated spaces, where shared understandings can be fostered and new ways of thinking developed. These knowledge experimentations reveal the importance of attitudes of collegiality, respect and generosity in building trust to facilitate mutual learning, achieve the desired co-produced ‘output’ and change practices around urban sustainability.

## Conflicts of interest statement

Nothing declared.

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