

INNOVATION ATELIERS AS COLLABORATION STRUCTURE FOR URBAN SUSTAINABILITY TRANSITIONS

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ABSTRACT

When transitioning towards climate neutrality, cities are seeking innovative ways to implement technical and smart solutions in the built environment. This requires collaboration, knowledge-sharing, and integrated planning. The Innovation Atelier method offers a structured approach to urban sustainability transitions, emphasizing learning, stakeholder engagement and system integration. Through the EU H2020 ATELIER project, eight European cities – Amsterdam, Bilbao, Riga, Bratislava, Copenhagen, Krakow, Matosinhos and Budapest – have established Innovation Ateliers in their respective ecosystems. These Innovation Ateliers were dedicated to the realization of Positive Energy Districts (PEDs) in the cities, by leveraging transnational cooperation (integrated knowledge sharing between the different cities and Innovation Ateliers) and local stakeholder collaboration. PEDs require not only adaptive technical and smart solutions but also seamless integration into the existing physical, social, governance and financial urban context. To ensure social support and alignment among stakeholders, a robust collaboration structure is essential. The Innovation Atelier approach fosters a shared vision, co-creation of solutions, and the active participation of the quadruple helix partners: government, industry, academia, and citizens. This paper demonstrates how Innovation Ateliers can facilitate capacity building for local governments and partners, accelerate realization, and develop knowledge sharing networks that can be sustained beyond the lifetime of the project. The Innovation Atelier approach provides a replicable framework for cities tackling complex sustainability challenges. By establishing enduring collaboration structures, cities can move beyond one-off solutions and create adaptive, long-term strategies for climate mitigation and adaptation. Drawing from the ATELIER experience, this paper highlights how cities, when working together from the outset, can amplify the impact of sustainable interventions. By showcasing practical outcomes best practices, cities inspire other cities to adopt collaborative, systems-based approaches to climate action.

Keywords: innovation ecosystems, collaborative governance, transnational cooperation.

1 INTRODUCTION

Urban areas are both significantly affected by, and major contributors to, the global phenomenon of climate change. Rising global temperatures have led to sea level rise, increasing the frequency and intensity of extreme weather events including storms, droughts, and floods as well as the spread of tropical illnesses. These impacts pose severe risks to critical urban infrastructures, housing, livelihoods, public health, ecosystems, and essential services and amenities. Today, cities account for a substantial share of global greenhouse gas emissions. Estimates indicate that approximately 70% of global CO₂ emissions originate in urban areas, primarily from buildings and transportation [1].

Beyond their environmental impact and exposure to climate-related risks, cities, with its high population density and limited production capacity, are particularly vulnerable to global shocks and geopolitical disruptions. Recent global crises, including the war in Ukraine and more recently in the Middle East, have triggered sharp increases in energy prices. These

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events have underscored the urgency for cities to accelerate the transition toward more autonomous, resilient, and sustainable energy systems [2]. In this context, cities emerge as critical arenas for both climate mitigation and adaptation efforts, requiring innovative, systemic, and collaborative approaches to ensure a sustainable urban future.

In alignment with the Paris Agreement, Europe has committed to becoming the first continent in the world to achieve carbon neutrality by 2050 [3]. The EU Green Deal aims to make the transition to a contemporary, resource-efficient and competitive economy, equitable and inclusive for all. Cities are at the heart of this transformation, serving as hotspots where decarbonisation strategies for energy, mobility, buildings, and industry intersect [4], offering a fertile ground for experimenting and scaling climate innovations. The significance of cities in addressing climate change is further underscored by the Intergovernmental Panel on Climate Change's forthcoming Special Report on Climate Change and Cities [5]. The report offers a comprehensive assessment on steps and remedies to lower urban risks and emissions, covering both adaptation and mitigation techniques.

Bulkeley and Betsill [6] and Corfee-Morlot et al. [7] highlight the need for systems thinking governance innovation, institutional capacity and multi-level coordination as key levers to accelerating urban climate action. While the ambition of sustainable urban development is widely endorsed, its transition into effective local practices is not as straightforward [6], [8]. Cities continue to face structural barriers in realising climate neutrality, including limited cross-sectoral integration, fragmented, rigid and non-inclusive governance models, inadequate financing mechanisms and insufficient societal support [9]. Hence the research question we will address how the Innovation Atelier approach facilitates integrated local innovation and transnational learning in co-creating and implementing urban sustainable innovations in European cities. As this paper will demonstrate, coordinated, multilevel coordination (e.g. local, regional, national and international scales) is essential to enable cities to overcome these challenges and implement effective and enduring sustainability strategies.

Relatedly, while the value of collaborative and adaptive governance frameworks in stimulating innovation is widely recognized, operationalising these remains complex. It is challenging to manage diverging interests, timelines and capacities, and to transition from pilot projects to broader, formalised and institutionalised arrangements.

Two critical knowledge gaps hinder the progress in urban sustainability transitions. The first concerns the operationalisation of collaborative and adaptive governance; specifically, how to structure multi-actor processes that foster innovation across public, private, research and civil society sectors. The second relates to the practical implementation of sustainability ambitions and more specifically how to translate strategic goals into context-specific actions. To address those gaps the Innovation Atelier methodology was developed and validated within the EU H2020 ATELIER project. This research involved both the conceptualisation of the Innovation Atelier as a governance model and its validation through real-life application in eight European cities in the context of the co-creation and realization of Positive Energy Districts (PEDs). As this paper will demonstrate, the IA approach offers a broader applicability across other urban sustainable transitions domains.

This article is structured as follows. First, we introduce the methodological framework of the Innovation Atelier approach and its theoretical foundations, where we also present it in the context of the Smart City and Community project ATELIER. Second, we present in the discussion and conclusion sections how the Innovation Atelier framework has performed with the key lesson for further adoption.



2 INNOVATION ATELIER APPROACH

The Innovation Atelier (IA) is a collaborative approach developed to support cities in designing and implementing sustainable urban innovations tailored to their specific socio-economic and institutional and spatial contexts. It was conceptualized, developed and validated within the EU funded H2020 project ATELIER, where it guided the planning and realization of Positive Energy Districts (PEDs) in eight European cities. PEDs are urban areas or clusters of connected buildings that generate on an annual base more renewable energy than they consume and share their surplus to a regional or local energy grid [10]. Drawing on both practical implementation and academic literature, the IA offers a structured and flexible governance model that enables the operationalisation of collaborative, adaptive governance and the practical implementation of sustainability ambitions in context-specific ways. Each element includes best practices derived from real-world applications within ATELIER. This section introduces the three principles behind the Innovation Atelier approach, the five implementation stages, its six key components and the multilevel governance structure.

2.1 Principles of the Innovation Atelier approach

The Innovation Atelier approach rests on three interrelated principles: (1) stimulating open innovation in the quadruple helix; (2) co-creating sustainable solutions and supporting measures; and (3) sustaining the long-term partnerships.

2.1.1 Open innovation

Open innovation emphasizes the value of combining internal and external knowledge sources to advance technological and societal solutions [11]. It has gained traction as an alternative to more traditional, siloed models where innovation developments and returns were internalised within organisations. Instead, it argues, open innovation fosters cross-sectoral collaboration among previously disconnected actors [12]. Through this effort, open innovation blurs the demarcation between research and practice, and between practice and policy [13]. Scholars see open innovation as a necessity in addressing complex societal challenges such as climate change [12], [14].

The Innovation Atelier stimulates open innovation by bringing together stakeholders from the quadruple helix (e.g. municipalities, businesses, knowledge institutes, and civil society) to collaboratively develop innovations. The process relies on continuous iteration, mutual learning and a network structure that enables short feedback loops and adaptability.

2.1.2 Co-creation

Adopted from proven Living Lab methodologies, the co-creation of knowledge is being enabled by local embeddedness, room for experimentation, local stakeholder participation sense of ownership and attention for evaluation [15], [16]. To further contextualize the co-creation and experimentation, Steen and van Bueren [17] propose an extended set of characteristics that highlight innovation, real-life environment experimentation and the focus on urban sustainability.

In the Innovation Atelier, the local ecosystem is involved in co-creation development and validation of innovative solutions. The IA supports experimentation, user involvement, and continuous refinement in a real-life urban context [15]. This approach allows cities to move beyond isolated technological fixes and instead embed sustainable practices within broader governance, regulatory, and financial frameworks. As a result, the IA supports the local ecosystem in addressing structural and regulatory barriers by identifying outdated



institutional arrangements and supporting the development of new governance models, business strategies, and financing mechanisms.

2.1.3 Sustaining partnerships

The long-term continuation of partnerships is essential to make a lasting sustainable impact, through continues involvement with innovation development, capturing lessons learned and disseminating results to others. Santonen et al. [18] state that long-term commitment and political endorsement is crucial for a complete implementation and continuation of sustainability strategies.

The IA responds to this by embedding monitoring and adaptive feedback loops, ensuring solutions remain relevant and effective within evolving urban societies. In doing so, the IA aims to evolve from a time-bound project instrument into an embedded, adaptive institution capable of guiding systemic urban transitions well beyond the lifecycle of individual initiatives. Each IA is encouraged to develop detailed plans covering both short-term operations and long-term sustainability. These include identifying potential revenue-generating activities, such as delivering services or innovations to local stakeholders, and securing supplementary funding to bridge financial gaps.

2.2 Stages of implementation

The implementation of Innovation Ateliers consists of five stages (Fig. 1). These stages represent the evolving conditions and maturity levels of governance structures as they collaborate towards developing solutions to address complex sustainability challenges. This progression reflects a shift from defining an initial scope and mission and engaging stakeholders, towards an IA that expands its scope and activities to address broader ecosystem needs, facilitate cross-city and cross-project learning and mature in an organization that can sustain innovation over time [19].

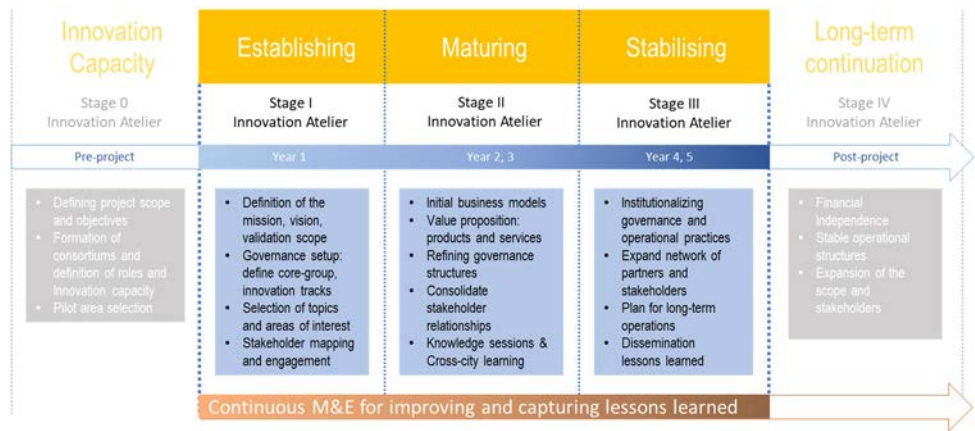


Figure 1: Stages of implementation of an Innovation Atelier.

2.2.1 Pre-requirements and innovation capacity

This stage is the preparation for a successful deployment of an Innovation Atelier in any given urban sustainable transformation challenge. It entails the assessment of key conditions:

understanding and strengthening organisations' innovation capacity [20], stakeholder mapping and engagement, commitment, trust and a well-functioning governance structure.

2.2.2 Establishment

The goal of the establishment stage is to set the foundational structures for a collaborative environment where diverse actors can align on their goals. It starts by bringing together all relevant stakeholders and partners to discuss the mission, vision, objectives and organisation of this new partnership, and how it is ultimately supporting the realization of the innovation project.

2.2.3 Maturation

Activities in this stage focus on refining operational methods, strengthening partnerships, and enhancing local innovation capabilities. In this stage ideas are tested, networks expand, and the first pilots or innovation project(s) are implemented.

2.2.4 Stabilising

In the stabilising stage the Innovation Atelier's processes and governance are fully embedded and operational and the focus shifts to developing a long-term strategy that typically includes a form of institutionalization in the local ecosystem to support the continuation of activities, replication and upscaling potential [21], [22].

2.2.5 Long term continuation

The long-term continuation stage typically begins after the project termination and focuses on sustaining the IA as a stable governance structure. By this phase, the IA is typically institutionalised and embedded in local strategies and initiatives. During this phase IA may amend the mission, geographic scope or core group composition in response to changing ecosystem needs. Financial sustainability is often secure for the following years through a combination of EU and national funding, and in some cases, alternative models such as paid memberships.

2.3 Components of the Innovation Atelier approach

The Innovation Atelier framework consists of six components that operationalise its core principles: open innovation, co-creation, and sustaining partnerships. These components are crucial for aligning innovation efforts with the needs of key actors, mobilizing stakeholders, and scaling solutions for lasting impact. Additionally, they serve as both guiding principles for the IA implementation as well as monitoring components that trace the evolution of governance condition over the IA implementation stages. This flexible approach offers an alternative to rigid performance metrics by focusing on mapping enabling the conditions rather than fixed outcomes. This is because improperly designed or inflexible performance metrics can hinder innovation efforts [23] by focusing on specific outcomes that may lose relevance as the IA matures. Giving the evolving nature of IAs, with shifting mission and vision, early-stage innovations, such rigidity can be counterproductive on complex, multi-stakeholders, multi-domain governance and innovation contexts.

2.3.1 Vision, mission and strategy setting

Radical and structural systemic change towards a sustainable society requires long-term and systemic outlooks. Gaziulusoy and Ryan [24] call this type of knowledge 'transformation knowledge' and note that it is 'about building the potential paths between the current 'undesirable, unsustainable' and future 'desirable, sustainable' states of the systems that are



subject to transformation' [24, p. 1619]. Developing a shared vision and mission provides strategic direction for the Innovation Atelier's contribution to urban sustainability. Collaboratively setting this vision and mission helps align diverse perspectives and foster collective ownership. Based on the ATELIER case, a successful mission and vision evolve over the IA implementation stages, adapting to emerging challenges, local ecosystem needs and agendas (e.g., climate or energy transition agendas) and project dynamics.

2.3.2 Value proposition

The value proposition component describes the products and services the IA offers to the local innovation ecosystem working in a sustainable urban transition. Based on the ATELIER experiences, a successful value proposition typically includes access to a key stakeholder group, expert sessions, co-creation activities, access to a pool of experts and support for funding opportunities and capacity-building. As the IA matures, the value proposition expands to promote cross-city and cross-project enabling replication and knowledge exchange between cities and projects.

2.3.3 Strategic coordination

The strategic coordination component assesses how an IA is embedded in the local, cross-city and cross-project innovation ecosystem. Effective strategic coordination ensures the alignment with the agendas of the key actors and enhances the IA's capacity of catalyse systemic change. Context-sensitive adaptations throughout the implementation stages, such as expanding the IA's scope from PED to a broader energy and heat transition, enabled cities like Bilbao to position their activities in a wider spatial and thematic domain, fostering innovation at scale and long-term continuity. In doing so, Bilbao also contributed to cross-city learning by disseminating its experience with their 5th generation district heating solutions with other ATELIER cities [25].

2.3.4 Open innovation activities

Open innovation activities are collaborative actions where stakeholders co-create and test solutions to local sustainability challenges. In ATELIER, these included expert sessions, workshops, ideation sessions and real-life experiments. Costa et al. [26] note that when developing sustainable products ecosystem co-creation enhances innovation impact, trust and societal resilience. Best practices identified include coordinating joint activities with key players in the ecosystem, focus the expert sessions on addressing shared bottlenecks and support to support capacity building and organizing workshops focusing aimed at translating shared priorities into funded projects.

2.3.5 Learning and knowledge diffusion

This component is about how the Innovation Atelier captures insights from its activities and disseminate them within local ecosystems, cross-city and cross project level. Costa et al. [26] rightly consider human capital as the basis for the collective knowledge creation. Embedding systematic knowledge generation, monitoring and capacity development in the processes and activities benefit the innovation ecosystem. In ATELIER, best practices included the participation in local and EU events and platforms, cross-city workshops and visits and targeted communication strategies tailored to different stakeholder groups.

2.3.6 Organisational capacity

Organisational capacity refers to the structures, operational resources, and governance mechanisms that are needed to operate Innovation Ateliers successfully. The capacity of



organisations to create and exploit new knowledge is inherent to innovation [27]. A strong organisational structure enables effective coordination, allows for the integration of citizen perspectives, and ensures the flexibility to scale and sustain innovative solutions in the long-term. Within ATELIER, we see that the Organizational capacity in IA benefits from appointing clear leadership roles, installing knowledge and innovation tracks on cross themes (e.g. legal, technical, financial), and ultimately embedding the IA into existing organisational structures. This has resulted in the supply of dedicated knowledge where needed for instance, or effective exchange during city events, and delivering strong strategies for long term continuation [25].

2.4 Multilevel governance structures

To support collaborative innovation and systemic learning, the ATELIER project conceptualized and implemented a three-tiered governance framework that operates at the local ecosystem, a cross-city level, and cross-project level (Fig. 2). These levels are dynamically interrelated, forming an evolving architecture of governance as the project matures from niche experimentation to broader systemic uptake [28].

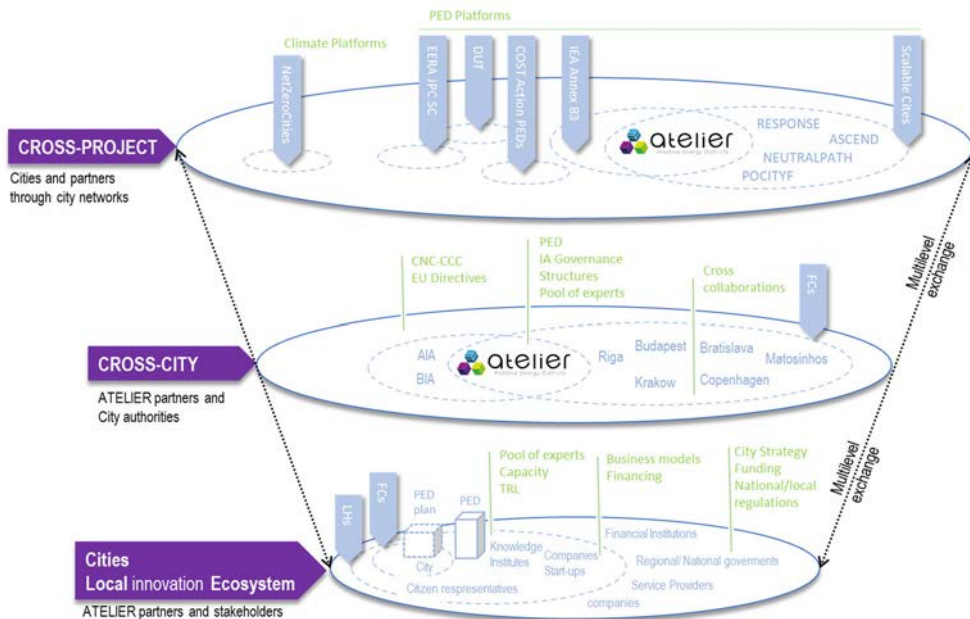


Figure 2: : Multilevel strategic governance exchange.

In line with academic and empirical research in innovation sciences over the last decades, innovation ecosystems highlight a similar challenge: the lack of effective strategies to formalize and sustain multi-actor collaboration at the local level. Scaling from experimentation in the field (so called niche stage) towards broader diffusion and implementation (into the regime) is challenging. Drawing from strategic niche management and transition theory, innovations, both technical and social, often emerge within protected ‘niche’ spaces, but scaling them requires alignment with broader socio-economic ‘regimes’.

Multilevel governance supports this shift by enabling cross-scale learning, coordination, and the gradual embedding of innovations into institutional frameworks [29]–[31].

Optimizing the opportunity to learn, inspire and to wider implement the practice of PEDs, the ATELIER project has embraced this multilevel governance structure, enabling the city experiments to exchange lessons learned, stimulate the cross fertilization and activate cross city learning.

At the local level, each participating city implemented their Innovation Atelier in its local urban context, considering the local stakeholder needs and strategic agendas. The IA approach provided a structured yet flexible roadmap for collaborative innovation, offering guidance on stakeholder engagement, business plans, value creation, and stakeholder management. It facilitated the engagement of key actors, and the integration of best practices and lessons learned in the local innovation ecosystem [25].

At the cross-city level, cities engaged in structured peer learning, sharing insights, challenges and strategies, helped to benchmark their progress, created local capacity and accelerated institutional learning. ATELIER's learning model, Lighthouse cities Amsterdam and Bilbao inspired six Fellow cities to adopt and tailor proven methods and activities, supported the replication of successful governance structures across cities and contributed to building institutional capacity. This model not only accelerated local implementation but also inspired broader adoption across other European cities.

At the cross-project level, multiple platforms working on similar sustainability challenges exchanged best practices, co-developed resources, and aligned strategies across projects. At this level, learning and impact was amplified beyond the individual project and city scales. In ATELIER, such collaboration was fostered through active engagement with initiatives like the EU Scalable Cities platform and NetZeroCities, including joint and co-organised events and co-authored publications.

Within ATELIER, the multilevel exchange of knowledge and experience enabled the cities to learn from the knowledge developed, or experience of other cities, dealing with similar urban challenges. Amsterdam experimenting with applying Energy Communities to empower energy citizenship for instance, was appreciated much by other cities, and a great number of cross city sessions have been dedicated to sharing the real lessons learned. We observed similar fruitful exchanges between cities dealing with the challenge of making their (existing) district heating networks more sustainable, and discussed the different technical, financial and legal options to pursue among peers [25].

Although analytically distinct, the three governance levels are interdependent and interact dynamically over time. In the early stages of the IA development, emphasis was placed on establishing local relationships and articulating initial missions through the Innovation Ateliers. As these efforts and relations matured, the emphasis shifted more towards cross-city learning and, eventually, to integration within cross-project networks, illustrating the adaptive and non-linear nature of urban transition governance.

3 DISCUSSION

The application of the Innovation Atelier approach in the ATELIER project has shown promise as a governance model for collaborative urban innovation. ATELIER cities have found it valuable in establishing, integrating, and maintaining multi-actor governance structures. However, there are also several limitations and remaining open questions.

First, the Lighthouse and Fellow Cities structure proved valuable in facilitating knowledge transfer, sharing best practices and lessons learned, and providing access to experts from the project' knowledge institutes (e.g., legal expertise). This structure supported an accelerated implementation process in Fellow Cities, enabling the establishment and stabilization of IAs



in a shorter timeframe. However, this acceleration together with more limited resources often resulted in a stronger focus on long-term continuation. The lack of presence of key actors' knowledge institutes, businesses and civil society in the FC core group also represented a challenge. Local ecosystems vary widely in institutional setups, political dynamics, and stakeholder capacities for this is important that all the key actors are actively engaged in the core group. Future iterations of the approach should include clearer guidance on how Fellow Cities can rapidly implement the IA approach and include key actors in the IA core group.

Second, the long-term continuation of the Innovation Ateliers beyond the lifespan of the ATELIER project has not yet been proven. While all IAs are expected to be institutionalized and embedded into local structures, many remain dependent on the timelines of related projects and initiatives and, are sensitive to shifts in local political agendas. For some, the continued operation of these platforms is still dependent on EU and National funding. Further research is needed to investigate how this governance structures evolve its scope and organization to continue supporting local ecosystems over the long term. Additionally, clearer pathways are needed for developing sustainable business models that reduce reliance on EU and National funding.

Third, while the innovation Atelier concept was developed and validated within ATELIER project, its applicability has already been demonstrated in other projects and initiatives beyond the energy domain, suggesting its potential as a transferable governance model for urban sustainability transitions. However, several questions remain regarding the conditions under which the IA model can be effectively implemented in other sustainable urban transitions. How the model can be adapted to ecosystems with various level of maturity in cross-actor collaboration and innovation? What are the prerequisites are necessary for the successful adoption of an IA? How can an IA be established and matured without active involvement of innovation experts? These questions highlight the need for further research and practical implementations in other projects and initiatives.

4 CONCLUSION

The Innovation Atelier is a practical approach designed to support cities in addressing key challenges associated with the development of sustainable solutions towards climate neutral cities. It is developed to help cities in establishing and maturing a relevant collaborative governance structure. The research question for this paper was about how the Innovation Atelier approach facilitates integrated local innovation and transnational learning in co-creating and implementing urban sustainable innovations in European cities.

The Innovation Atelier's implementation unfolds in five distinct stages, each designed to ensure that the governance structures evolve and adapt over time, leading to lasting impact. Operating at multiple levels, the Innovation Atelier enhances collaboration by aligning with key stakeholders' agendas. It facilitates structured knowledge exchange among cities and fosters synergies with EU-wide sustainability initiatives. This multilevel governance approach ensures that the Innovation Atelier remains relevant and effective across different contexts.

One of the key strengths of the Innovation Atelier is its adaptive evaluation framework, which goes beyond static performance metrics. The six components of the Innovation Atelier provide a context-sensitive evaluation structure, supporting cross-city learning and enabling the sharing of insights and experiences. This flexibility allows the Innovation Atelier to adapt to the unique needs of each city and its stakeholders.

The mission of the Innovation Atelier evolves across its implementation stages in response to stakeholders' agendas and needs, ensuring continued relevance and engagement. By offering access to experts, stakeholder networks, workshops, expert sessions, and capacity-



building initiatives, the Innovation Atelier provides a tailored value proposition that meets the specific needs of the local ecosystem.

The Innovation Atelier methodology was key in enabling multilevel governance interaction. By supporting local, cross-city and cross-project co-creation exchange, it acted as a boundary-spanning tool, facilitating the flow of knowledge and practices across levels. This not only enhanced project delivery but also strengthened institutional capacity for long-term transition governance.

This paper has assessed the added value of the Innovation Atelier approach in the case of ATELIER project. It has been proven promising in collaboratively organising innovation. Further research could adopt and tailor the principles, stages and characteristics of Innovation Atelier to assess its adaptability to various local contexts. In the global fight against climate change, related urban- and energy transitions can benefit from effective governance and knowledge exchange. The Innovation Atelier approach is an attempt to accelerate this process.

ACKNOWLEDGEMENTS

This publication has been founded by the European Union's Horizon 2020 research and innovation programme in the context of the ATELIER project grant agreement No 864374.

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