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Integrated Collaborative Governance Approaches towards Urban Transformation: Experiences from the CLEVER Cities Project

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Abstract: Within the framework of CLEVER Cities Horizon 2020, London, Milan, and Hamburg are putting in place nine Urban Living Labs in order to implement Nature-based Solutions that address urban challenges in socially disadvantaged neighborhoods. In this article, the means by which co-creation processes and pathways may lead to innovation in governance structures are considered. Through a comparative case study analysis, this research aims to identify integrated, collaborative governance frameworks that are complex and adaptive, as well as reflect the actual changes in governance in cities. Herein, ULLs are intended not just as a vehicle for place-based urban regeneration but also as a starting point for collaborative governance. In this article, it is considered how co-creation pathways may lead to innovation in current local governance structures and achieve transformational change. This paper analyzes the collaborative governance dynamic models at three points in time in the three cities. It is also considered how co-creation pathways may lead to innovation in current local governance structures and achieve transformational change.

Keywords: nature-based solutions; shared governance; urban regeneration; governance models; urban transformation

1. Introduction

Cities are finding new ways to address pressing societal and environmental challenges. Urban shared governance approaches, and models are a key part of the innovation and change needed, as it is now clear that community-led initiatives are critical for success [1]. More research, led by a practice-based approach, is needed to provide support to local authorities as they move to adopt co-created Nature-based Solutions (NBS) [2,3]. This continued research can lead us in unpreceded directions. For example, there currently seems to be a tendency towards the adoption of bottom-up initiatives in participatory planning, though there is a range in the approaches taken and a new openness of cities to community-led initiatives. New trends and results are beginning to show that urban transformation in spatial planning can and should progress along many diverse, unique pathways [4–6], including recognizing when moves away from bottom-up actions would be helpful, which can be somewhat counterintuitive.

This research aims to investigate the various possibilities of governance typologies that were adopted in CLEVER Cities (a Horizon 2020 project which spans from 2018 until 2023) and to document how complex adaptations occur in cities' governance structures over time. Specifically, we analyze the changes in collaborative governance models from the post-processing of the CLEVER Cities experiences in the three frontrunners cities of London, Milan, and Hamburg that helped fertilize the pathways for urban transition and

regeneration. In each city, a co-creation process has been initiated with local authorities, municipalities, academia, private actors, civil society, and citizens to support the effective urban regeneration processes that respect each city's context [7]. CLEVER Cities project also has six fellow cities that adopt the urban greening processes of the three frontrunners with less structured co-creation processes.

An in-depth perspective is given on aspects of shared governance and Urban Living Labs (ULLs), especially those related to large-scale urban regeneration projects that aim to achieve both in-depth local stakeholder empowerment and community-wide involvement [8–10]. Herein, ULLs are intended not just as a vehicle for place-based urban regeneration but also as a starting point for more collaborative approaches towards shared governance. In response to local contexts, such as existing social structures and local institutional arrangements, different governance models evolved accordingly. Following a Multi-level Perspective [11], within each of the three cities, an examination was made of the range of integrated collaborative governance models that emerged and the changes and adaptations observed at three points in time during the process: at its initiation, mobilization, and at its consolidation phases. The first phase of the co-creation process aimed to establish an Urban Innovation Partnership (UIP), which was comprised of local clusters of stakeholders and formed using some form of partnership. During the co-design and subsequent phases, each city's ULLs' developed their own collaborative governance models based on the specific circumstances encountered.

Throughout the research materials and methods section, an analysis of the development of the integrated collaborative governance models is explored and then mirrored in the following sections based on the narratives from London, Milan, and Hamburg. We pose the questions: How have diverse pathways moving towards integrated collaborative governance led to more complex and adaptive governance approaches? As well as to what extent do the recurrent models of shared governance from different cities have correlations with their social and spatial contexts in the settings of their respective co-creation processes? In the last section, discussions and conclusions are drawn from the processes of developing integrated collaborative governance frameworks over the three phases.

1.1. Literature Review

"*Governance is a negotiation mechanism for formulating and implementing policy that actively seeks the involvement of stakeholders and civil society organizations besides government bodies and experts. It is a model of decision-making that emphasizes consensus and output and that claims to be participatory*" [12]. Shared urban governance in cities is a critical component of improving urban sustainability through innovative urban transitions [13]. Shared governance systems will typically differ due to the context in which they are formed, the internal relationships established, and perhaps most importantly, the level of citizen engagement. This can range from being informed to being fully empowered, as described on the ladder of participation [14,15]. More collaborative forms of governance are especially important, considering the challenging times we face related to climate change and the need for significant, validated actions [16–18]. The recent shift toward empowering the community is not based on methods where local knowledge is extracted by outsiders, but instead, it is shared by the community that engages in the problem-solving processes from the start [19].

Co-governance can be understood in its functional sense as "processes and structures of public decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished" [20]. There are multiple possible pathways forward as cities adapt their governance networks to deal with new system contexts [21]. In the case of NBS projects, while intuitively regarded as necessarily bringing multiple benefits through their implementation, they still must respond to the local influences and the unique starting conditions [22,23]. There are many drivers that will influence the pathway forward, and based on Emerson and Nabatchi [24], these may include:

- Local issues and resources.
- Policy and legal frameworks.
- Participatory culture and history of relations in the community and project partners.
- Network characteristics of previous iterations of socio-political organization.
- Political dynamics and power relations.

With respect to governance, cities have to cope with the multiplicity of contemporary challenges and complexities, and this has led to many organizational rearrangements in order to establish appropriate network relationships. To begin to deal with the vastness of climate change prevention, mitigation, and adaptation actions, scholars have started to incorporate the concept of urban transition as a needed paradigm to address critical changes in the urban environment [5]. Urban transitions are conceived as *"complex, long-term uncertain and contested processes of radical change in urban systems,"* processes that are not manageable with traditional policy-making and incremental changes [25–27].

Urban transition governance, hence, describes an attempt to find an equilibrium between self-organized urban systems and the idea of planning for the achievement of shared societal goals. In this sense, it creates the key conditions for mobilizing and steering urban actors [28,29] and their resources toward long-term sustainability and resilience goals increasing the ability to respond to change [25]. Therefore, urban transition governance refers to the concept of building capacities among the urban actors in specific contexts; in this article, these contexts are the ULLs.

ULLs are dynamic containers for changes in the urban public domain; see also [30,31]. Puerari et al. [32] give a spatial definition for ULLs as *"embedded sites for co-creation of knowledge and solutions"* by conducting local experiments and hence are an arena for reflexive, adaptive, and multi-actor learning environments, where novel solutions can be experimented with. They represent sites that allow different urban actors to design, test, and learn from socio-technical innovations [33]. However, despite the recent proliferation of ULLs in the European policy sphere, the underlying process through which ULLs generate and diffuse new socio-technical knowledge beyond their immediate boundaries has been challenging, and it remains to be examined how they can contribute more fully to urban sustainability transitions [34].

1.2. Setting the Context

The CLEVER Cities project (See the CLEVER Cities project page https://clevercities. eu/—accessed on 18 November 2022) has been active since 2018, experimenting with the implementation of Nature-Based Solutions (NBS) in three front-runner cities and six fellow cities. Among other H2020-funded projects (e.g., proGIreg, UNaLab), CLEVER Cities aims at implementing NBS by adopting a co-creation approach as an integral part of the project development, leading to the establishment of collaborative governance frameworks [7]. The specific focus of CLEVER Cities lies in tackling the social inclusivity and cohesion dimensions of NBS implementation within the existing urban context. The intervention areas are located in socially disadvantaged neighborhoods experiencing various forms of marginalization, and NBS implementation is expected to produce positive impacts in these areas. Two main levels of decision making are recognized. The first level corresponds to the Urban Innovation Partnership (UIP), describing an overarching network of actors coordinating the overall activities of the CLEVER Cities project in each of the three cities. The second is the CLEVER Action Labs (CALs), which is a nested sub-structure of the UIP that focuses on specific spatial areas with stakeholder groups that were either similar to the UIP, partially overlapped that of the UIP, or that had some common stakeholders. The CAL represents the ULL within the CLEVER Cities project nomenclature. As co-creation processes evolved, the need to identify, strengthen and build stakeholder partnerships in order to develop community-based and validated Urban Living Labs became the initial driver towards the creation of the first collaborative networks in each of the cities: London, Milan, and Hamburg. The way each partner city started the process of connecting with stakeholders led the projects down specific organizational pathways that had to bridge

the working relationship between UIPs and CALs. This eventually led to functioning governance structures that, in general, could not be classified as simple, one-level networks.

The changes in network relationships in the UIPs and Living Labs were able to help bring transformational learning, relational thinking, and transparency needed for the ULLs to advance their goals. Networks can adopt different strategies which either alter the internal workings of the organization or strive to maintain some independence and form intra-network relationships that play a role in developing both deep and wide community engagement. A range of network characteristics has been observed, and it was necessary to expand the list of reference typologies not only to describe subtle variations in nodal relationships but also to develop a full spectrum from highly top-down networks to horizontally grouped networks to understand how governance structures move up and down this spectrum. As the project progressed, adaptations and changes occurred, and as each iteration occurred, new governance constellations evolved, but there were some clear patterns in the ULLS of all three cities. It is hoped that these can offer insights into possible, successful strategies for the development of co-governance structures in other contexts.

In the case of the Urban Innovation Partnership in London led by Peabody (a London-based housing association) in partnership with the Greater London Authority (GLA), contextual issues specific to the South Thamesmead region set the way forward for initial engagement, co-creation, and the eventual governance structures that emerged. One key factor was the limited level of existing social structures encountered, coupled with consultation fatigue and general distrust towards top-down projects. Some limited trials with community-led development have begun to revert this general picture, and together with CLEVER Cities, we now see the growth of a burgeoning culture of participation in the area. Also important was the relatively compact institutional context with one main landholder, Peabody, clearly setting the framework for the governance networks that developed. Both Hamburg and Milan had unique conditions for the new UIPs that were developed, but as the projects evolved, similarities in governance structures would also be noticed.

1.3. Integrated Collaborative Governance Framework Set-Up

As governance systems evolve along a pathway, the move towards more collaboration brings with it a number of essential changes. These changes not only better prepare the actors for needed urban transformations but also support higher levels of participation [15] by creating trust and the conditions for cross-boundary engagement and dialogue. These are evolving changes and adaptations, based on Emerson and Nabatchi [24], that include:

- The creation of the context for **transformational learning** of urban actors.
- Involving agents to utilize and reach new levels of **relational or systems thinking.**
- Changes in responsibilities for the day-to-day management.
- Changes in the degree of collaboration in the decision-making process.
- Adaptations in networks, network roles, and intra network relationships that alter locus and distribution of decision-making power.
- **Differences in the flow of information**, including how it is filtered, weighed, validated, and approved.
- Building of trust through **principled engagement** and increased transparency.

In general, a move towards more collaborative governance will, more often than not, involve a move from a top-down starting point to a network typology that is more horizontally organized (see governance network models in Figure 1 and in Supplementary Materials, Figure S1). This will help to include more community knowledge, new perspectives, and added motivation to the decision-making process without losing a level of clear responsibility for day-to-day management activities. Most urban regeneration projects follow some variation of this. As a project with initial sole source funding, the CLEVER Cities urban living labs all had some component of migration from a system that had top-down characteristics to something that was less structured.
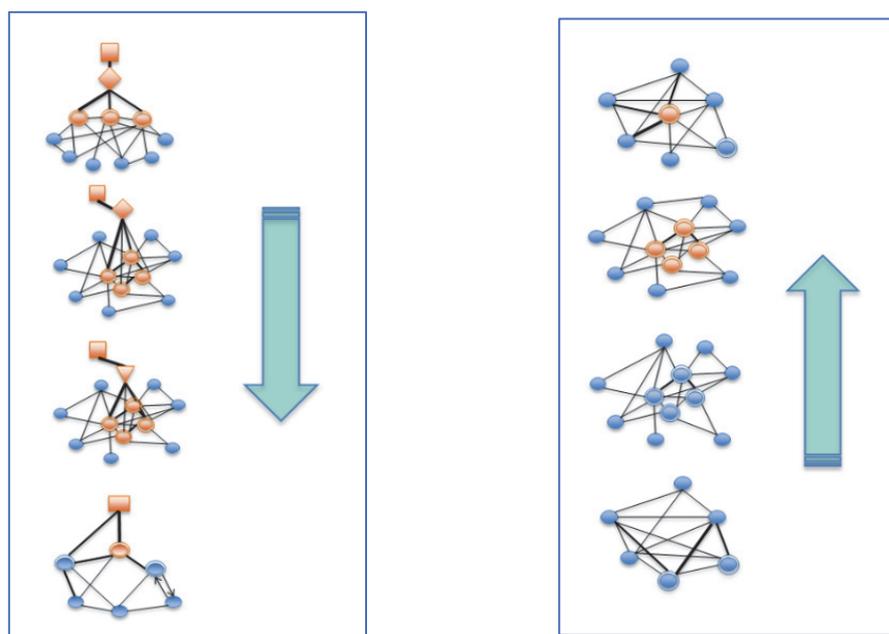
Figure 1. Integrated governance models moving to the middle ground (**left**: top-down, **right**: bottom-up); see all detailed models in Supplementary Materials and note below. Source: The Authors. Note: The network types presented are not full maps but show typical relationships between lead actors (orange squares), gatekeepers (orange diamonds), enablers (orange triangles), mediators (green circles—not shown here), and actors given some top-down appointed function (orange circles) or delegated functions by peers (double blue circles). Double circles, in general, show actors or groups that have been given administrative or other functions, and line thickness is used to illustrate that information flows vary in intensity.

However, it is also possible to see a move from a bottom-up starting point to a model which may involve a slightly more formal structure. For example, a loose network of community groups or stakeholders could benefit from working with an entity that either has a specialization in leading, organization, or management or by voting or delegating a group(s) to take on these activities. Bringing in specialized organizations that can guide and aid in the collaborative process can be an important process to create a context of learning by doing and capacity building that can help guarantee the survival of the network into the future.

Co-governance requires not only engaging people across different spheres and silos to accomplish more than standard decision-making processes [20], but it also requires a process of maturation that is typically needed in order to build up the capacities in a network, including key roles and responsibilities. Furthermore, these networks need to be both adaptable and develop a sense of permanence that extends beyond the strict limits of the project at hand [35]. As stakeholder relationships become more equal and horizontal, transformational learning and relational thinking are promoted. These are directly tied to the process of dealing with different and varied perspectives, adopting new roles, and taking on multiple responsibilities. Alterations in network relationships are an integral part of the development of co-governance. As stakeholder relationships become more equal and horizontal, transformational learning and relational thinking are promoted. These are directly tied to the process of dealing with different and varied perspectives, adopting new roles, and taking on multiple responsibilities.

In each of ULLs in the three cities, it was noted that co-governance does not only mean moving away from command-and-control systems but may also involve adaptations that change bottom-up organizations as well. What is perhaps the most important change in governance are moves from the extremes of either top-down or bottom-up systems to a relative "middle ground" of participation in which a 'structured horizontal' or 'delegated

horizontal' systems are most commonly utilized. This necessarily pushes stakeholders to learn to work with other types of urban agents: governmental agents collaborating with grassroots community groups or community members learning to work with technical or agency stakeholders.

2. Materials and Methods

The principal methodology utilized was a cross-comparative study of the process of evolution of governance networks in the three frontrunner cities of the Horizon2020 funded CLEVER Cities project, London, Milan, and Hamburg. Desktop research was conducted to gather the main information, screening through official documents and reports produced within the project framework. For each ULL, an analysis has been conducted with respect to conceptual models and typologies, leading to observations of possible trends and tendencies that led to stronger collaborative governance. The typologies were derived and substantially expanded on from a small sample from Kenis et al. [36] and presented as a spectrum of typologies (supplementary material). Among the plethora of actors' roles present in the literature, this paper focuses on few key ones to describe the network relations in shared governance typologies following a relational approach [37]. Relationship analysis in networks was used as the main theoretical framework for the conceptualization to study the different configurations along three identified snapshots in time of the decision-making process, namely **Initiation, Mobilization and Adaptation, and Consolidation** (terminology based on [38]). Furthermore, to identify those aspects observed in the living labs that have the potential to be extrapolated to other cities and contexts.

Instead of trying to describe the individual network structures of the UIPs and ULLs, an extensive range of variations on governance models was developed and laid out in a spectrum from the most top-down to the most bottom-up structures. Though not every possible variation is represented, the spectrum developed provides a relatively comprehensive reference from which it is possible to compare how governance networks can move along the spectrum from top-down to bottom-up (or the inverse) during the development process. In each of the three phases observed within the CLEVER Cities co-creation processes, see more [39], the cities compared their organizational structures to the spectrum to observe the evolution of the governance typologies for the major iterations to better understand the pathway that led to the consolidation stage.

2.1. Initiation Phase

In these initial stages of the process, each front-runner city needed to evaluate the contextual drivers that would help determine the key components to their approach to stakeholder mapping and the possibilities for both deep and wide engagement. The loose negotiations that can occur during the initiation phase were reflected in the evolving goals and semi-structured decision-making processes. Decisions in this first phase were often made from a technical, top-down perspective with only small inputs from community representatives. Early consultations occurred informally through already existing networks. As the framework conditions became clearer, the decision-making structures that initiated the process started to change to adapt to the new findings. The nearer to the end of the project, the network became more stable, and the decision-making methods became more consolidated.

During this initial phase, the process of developing more collaborative governance structures roughly followed an adapted version of the first steps of Hölscher et al. [25] Stewarding, Unlocking, Transforming, & Orchestrating procedures couched in Emerson and Nabatchi's [24] description of adapting governance. As mentioned above, an analysis of the project context is what determines the approach taken by the co-creation team, and it starts each ULL on its own pathway. Next, two main actions determine possible adaptations in the existing networks, which could move the dialogue to a more relational collaborative space and pursue the goals of the CLEVER Cities project. These actions include:

- **Unlocking**: dismantling organizational resistances and lock-ins that have led to non-collaborative path dependencies.
- **Designing or Orchestrating**: consider how creating and managing changes in the current multi-actor governance processes can foster improved synergies and self-organization and minimize trade-offs and conflicts across scales and sectors.

This process is usually focused on the networks that are already somewhat locked in and showing resistance to change. In some cases, new networks or connections need to be created to start to move the overall relationships to a more collaborative state. The final step of this phase was the establishment of the UIP in each of the three cities. The initiation phase transitioned into the **mobilization and adaptation** phase, when stakeholder mapping was mostly finished, and a preliminary version of the probable decision-making structures had been developed.

2.2. Mobilization and Adaptation Phase

During this phase, the CLEVER Action Labs were defined, and the co-creation processes started. ULLs experimented with setting up the first functioning versions of community-led decision-making processes. Carrying on from the first phase, existing networks were often tapped into for wide-reaching engagement. New governance structures that were being proposed and tested were most often moving towards more empowered forms of engagement. Eventually, initial forms of networks for both UIPs and CALs were put into practice for both detailed engagement and for reaching out to the wider communities. During the mobilization phase, networks undergo their last changes to their configurations in response to the various obstacles encountered. This can translate into the inclusion of new actors due to the shortage of resources or to solve possible conflicts among actors and overcome lock-in situations. Important actors in this phase are typically the mediators with their capacity to bring in new perspectives or to strengthen already existing relationships; see also [40]. Decisions in this phase are therefore related to rearrangement or changes in key actors to reach shared decisions on the interventions. However, observations from the project areas of the three cities show that the first network arrangement would not remain fully stable until the end of the project, and new nodes and/or new roles would still come into existence until quite late in the process.

2.3. Consolidation Phase

At this phase, experimentation and adaptation lessen, and the collaborative arrangements of the networks gain a sense of relative permanence. During consolidation, the second half of Hölscher's et al. [25] adapted model comes into play. Two more key processes helped to consolidate collaborative arrangements:

- **Adapting and Replicating**: from feedback loops creating and spreading new strategies or applying successful models when these are more apt.
- **Stewarding in Systems**: supporting continuous learning and system dynamics capacities that lead to behavior-changing cycles, including evaluation and feedback.

This could include gaining experience and training, consolidating the rules and norms of the stakeholders, and other forms of systematizing relationships. These processes led to co-governance models that were capable of carrying forward the bulk of the project's decision-making processes.

3. Results

The networks present in the UIPs of the three cities as they moved towards consolidation are depicted in Figures 2–4, and Table 1 highlights the key aspects of the UIPs that came into place during the co-creation process. The roles of the actors are defined according to the relational approach, i.e., focusing on the actual type of tie between the actors composing the network under analysis. We identified the following roles: leader (actor that has a coordinating function); enabler (actor that is able to mobilize or activate further actors); mediator (actor that moderates between two or more actors); gatekeeper

(actor that prevents or blocks other actors to enter in the process) [41]. For the sake of this article, these four actors' roles demonstrated sufficient to analyze the network structure in the case studies.
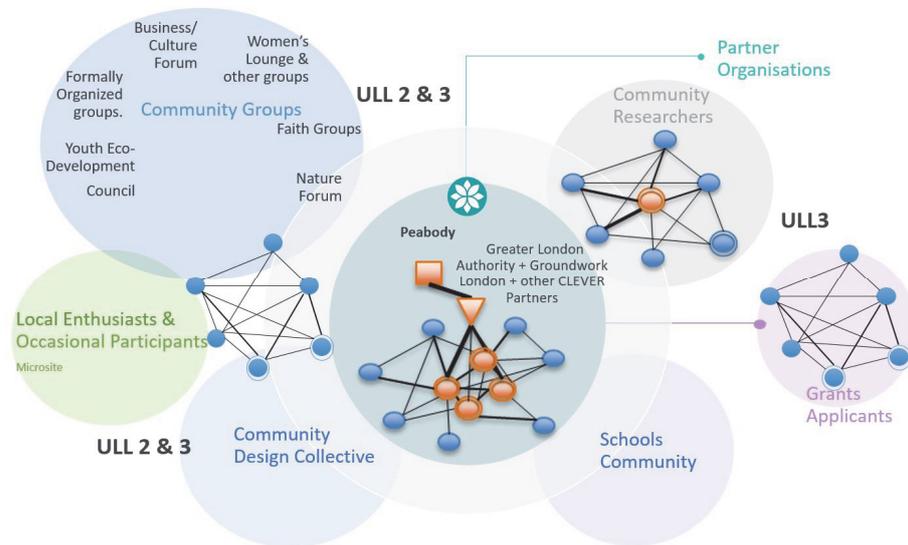

Figure 2. Integrated collaborative governance models depicted in London. Source: Bradley. Note: In South Thamesmead where the ULLs were implanted, Peabody was developing most projects following standard consultation methods. With the previous work in another neighborhood (the Moorings) and the new CLEVER Cities ULLs, new models were being tested that included residents earlier on in the process, with a wider scope of involvement and more significant powers over decisions.
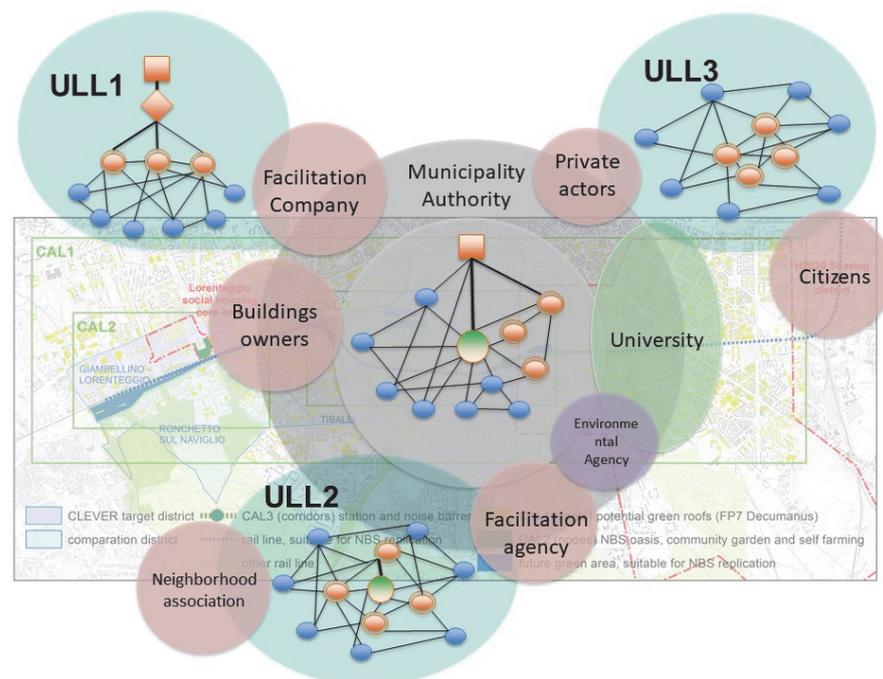

Figure 3. Integrated collaborative governance models depicted in Milan. Source: Mahmoud. Note: the Milanese case study was mainly led by the municipality as the main lead actor of the polycentric network. More in depth, the facilitation agency (Eliante) developed a more intermediary role as agreed within all partners to enhance the co-creation process flow. The University plays a neutral third partner role in the network to support the tools and methodological approach in co-creation adopted in the overall pathway towards an integrated governance process, see http://guidance.clevercities.eu/ (accessed on 18 November 2022) by Morello & Mahmoud, (2018) from Polimi.
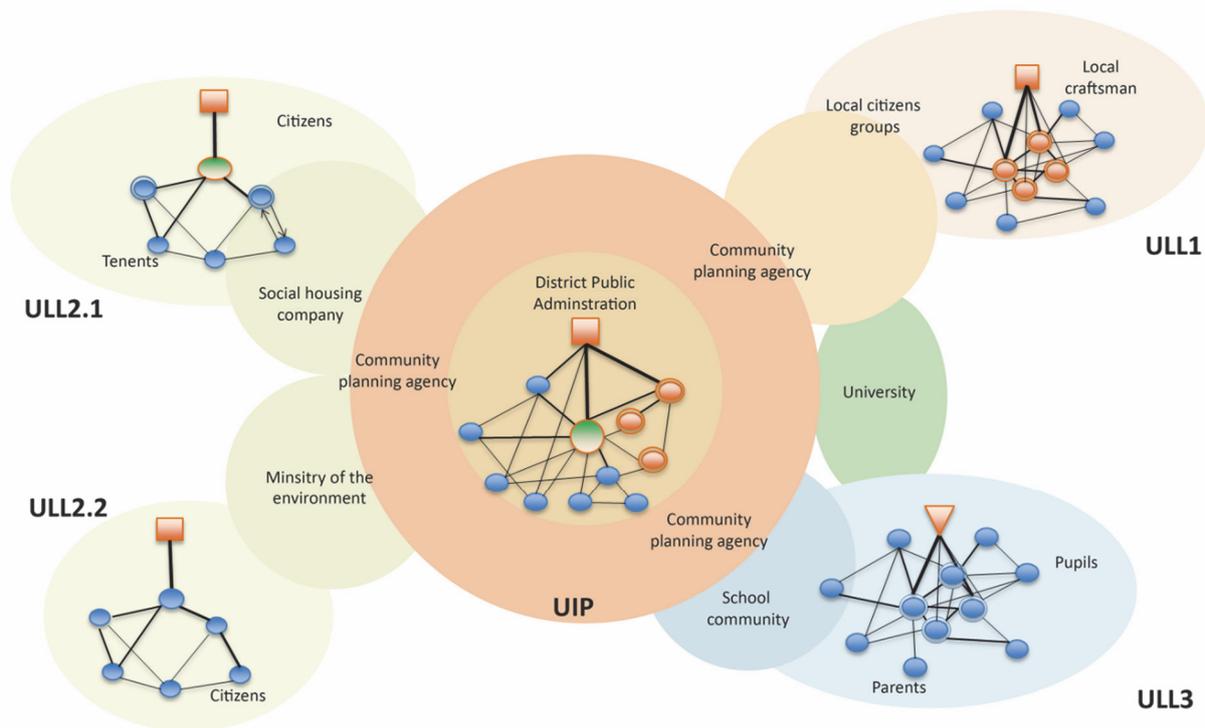
Figure 4. Integrated collaborative governance structure depicted in Hamburg. Source: Arlati. Note: the Hamburg case is mainly led by a network composed of the District Public Administration and the Community planning agency. The former had an overall coordination role, while the latter was responsible for activating further local actors (such as the school community in ULL3). Other project partners, such as the universities and the Ministry, contributed with additional theoretical knowledge and legal aspects.

Table 1. Comparative analysis of the three city structures across their co-governance schemes.

Leadership	Key Starting Approach	Core Typology Scheme	Polycentric Characteristic	Principal Pathway
London UIP (Lead: Peabody housing association with GLA CLEVER Cities lead)	Community building/trust building	Lead + enabler + appointed partnership + network	Yes, central partnership with three satellite networks.	Designing + strengthening intra-network connections.
Milan UIP (Lead: Directorate of urban planning, Municipality of Milan)	Municipality appointed stakeholders + manifestation of interest from local community and experts	Lead + enabler + appointed partnership + network	Yes, central partnership with three satellite networks.	Designing + strengthening intra-network connections.
Hamburg UIP (Lead: Department for the economy, construction, and environment)	Institutional stakeholder mapping	Lead + mediator + Appointed partnership + network	Yes, central partnership with four satellite networks.	Creating/strengthening internode connections.

It can be seen that although different governance networks were in play, the connections between networks tended to involve a lead or principal grouping that had more responsibility in making final decisions and satellite networks that reached out into the larger community. Thus, polycentric relationships were present in all three cities after our analysis. Having a core network connected to other networks is an example of a hybrid solution that helps keep decision-making structures in the middle ground between top-down and bottom-up systems.

From Table 1, it is possible to see that there were core networks in each of the cities and that all of them moved from a top-down to a more central governance position on the spectrum of typologies through the mechanism of an appointed or delegated partnership. As at least part of the funding initiative for this project came from a centralized source (the European Union in this case), it is not surprising that the move towards more collaborative governance in each of the three cities followed similar paths. Also of note is that in each of the cities, the core appointed network did not attempt to integrate and simplify all existing networks into a centralized decision-making group but maintained networks that were loosely connected by key stakeholders and enabling organizations. These key players often participated in different networks and made intra-network, polycentric governance a common solution for all three cities.

These commonalities are even more interesting, considering that the starting point in each city was different. Both London and Milan primarily utilized a design approach to the creation of the network, while Hamburg utilized a decentralized network of organizations that needed to be brought together in order for cooperation to occur. This demonstrates that pathways to collaborative governance can be varied, but a move to the middle tends to facilitate shared governance. Looking in a bit more detail at each of the cities, we can observe some commonalities and distinctions.

It is important to note that the above and following figures are not network maps but typologies which are positioned in relative functional relationship to one another. These figures, therefore, do not show the exact number of stakeholders that participated but rather the types of relationships that developed in each city's living labs. London's core partnership had an initial top-down component in that Peabody Senior Management first approves a contract which is then taken on (delegated responsibility) by the Landscape & Placemaking Team. The Team was open to creating a relatively horizontal governance structure together with the other partners in CLEVER Cities, including the Greater London Authority (GLA) and Groundwork London. From that point on, Peabody's Senior Management Team was made aware of key milestones, but the decision-making processes progressed in a way that explored significant levels of community participation. Thus, the project moved from what would typically be a top-down, technically based decision-making structure to one with community members as co-clients. This typology shown (in the consolidation phase) in Figure 2 describes the partnership formed between Peabody, the CLEVER Cities organizations, and the Community Design Collective (CDC), the latter of which was comprised of a diverse range of community members. Groundwork London eventually occupied the role of an enabler working directly with the CDC to facilitate the engagement process and interface with the design team.

Other satellite networks were brought into the process through differing processes. Local emergent groups were guided and supported, forming a network of socio-environmental groups that had overlapping members and community spaces and loose internal connections. For example, a group called The Nature Forum was part of a key nodal change when their role evolved from the initial conception as a possible design panel to becoming a socio-environmental stakeholder group brought together to consider Thamesmead's green infrastructure. Other smaller networks came together in distinct manners, such as the set-up of a group of Community Researchers or through the application of a Grants Program. These networks comprise individuals who are forming emergent networks through communications, meetings, and events.

Key stakeholders that played roles in the different networks were mostly responsible for creating intra-network connections, with the Community Design Collective members often working as the central figures in establishing connections and the Nature Forum members also playing a key role.

In Milan, a polycentric structure was identified in the UIP establishment process right from November 2018. An appointed project manager within the directorate of urban planning of the Municipality of Milan (CDM) led the project activities. The central role of the municipality directorate in this core network is related to the top-down governance

structure that comes from the financial resources to be deployed in the implementation of the NBS in the three ULLs. Afterward, each ULL brought together other actors that took on the role of enablers in the process within the local stakeholders' groups, see [42].

Based on each ULL's NBS types, responsibilities, and management processes, a new substructure of collaborative governance models that strengthen intra-networks connections emerged, as seen in Figure 3. In the ULL1 of the green roofs and walls, the main gatekeeper partner is leading the decision-making, especially related to the technical competencies of the co-design phase. Here, the CDM was responsible for the legislative procedures within the public call for building owners to be involved in verifying the building's construction status with respect to the added loads. In ULL2, two appointed actors adopted the role of enablers within the process. The facilitation partner and the local neighborhood association worked together to represent the local community from a bottom-up perspective. In ULL3, an enabler led a partnership in this model, governing the construction management of the NBS projects through two private partners. In all of the three ULLs of Milan, citizen participation was represented through neighborhood associations and local stakeholders that joined the UIP inter-networks, which reinforced the satellite constellation of the polycentric model initially developed from the start of the project in June 2018.

In Hamburg, a structure with some similarities to London and Milan was put in place. An appointed department within the District Public Administration (Department for the economy, construction, and environment) was given the lead role for the project activities; their goal was to streamline the activities at a local level in compliance with the project requirements. Other partners in the project were in charge of mediating between the administration and the local activities, such as the community planning agency and the universities [43].

This core group is represented in the middle of Figure 4. Each ULL within the Hamburg case followed a different process according to the steps taken to activate actors and the type of NBS to be co-created. ULL1 focused on a green corridor in which several local groups were coordinated by the UIP to realize small interventions following an overall strategy for implementation. Here, the public administration was responsible for the coordination of all efforts and building permissions. The planning agency activated local groups and brought them on board, while the university was coordinated and provided inputs for local innovative activities.

In ULL2.1, focused on a green façade for social housing project, the governance model was laid out in a more top-down fashion. In this case, the housing company held the most power in the decision-making process, but through the mediation of the public administration and planning agency, they put in place a participatory process to determine principal elements of the façade, such as the form and the type of vegetation. The other part of ULL2.2 was concentrated on stormwater management activities. In this case, many small NBS interventions were realized in the area in a process led by the Ministry of the Environment, with the Public Administration intervening for building permits. Citizens were involved post-implementation due to the high technicality of the solutions to monitor the actual effectiveness of the interventions.

The schoolyard project (ULL3) presented the most bottom-up configuration. The project partners established lines of communication which led to the possibility of obtaining funding to realize NBS. The schools had a strong leading role in guiding the project with their ideas. The process was conducted among the local actors with the mediation of the planning agency and the university, without the actual involvement of the public administration.

To sum up, the network structure that resulted from the different experiences in the Hamburg case presents a high degree of diversification according to the actors involved in the specific projects and the type of NBS realized. The final scheme forms a polycentric structure in which its centers are not strongly connected and are not hierarchic. At the same time, all actors were kept in contact thanks to the mediators and the guiding role of the

public administration so that all were involved or could contact the others. In the cases of ULL1 and ULL3, there were even some common events and co-design activities.

The consolidated networks described above for the three cities went through a few adaptions and changes before arriving at those specific configurations. The following are some observations on the process of adaptation at three different phases.

3.1. Initiation Phase Observations

The contexts of the three cities were all distinct. As mentioned above, South Thamesmead, London, had a notably low level of existing social organizations, which would usually comprise the main body of stakeholders, and this was important in determining its pathway forward. The project also had a relatively compact set of institutional actors that helped make any top-down decision making and approval processes quite agile when compared with other urban regeneration projects. Therefore, a clear strategy was to invest time and resources into community building and increasing trust. The process of dismantling organizational resistance was also relatively simple as Peabody had already begun experimenting with a few pilot projects in co-creation and was motivated to change their relationship with local residents.

Possibilities for the creation of new, multi-actor governance structures were considered as stakeholder mapping progressed. Peabody was interested in creating a partnership with CLEVER Cities and the Community Design Collective (CDC) in order to create an actual co-governance model. The CDC became an instrumental node, not only in the core partnership network but also as common stakeholders connecting other satellite networks into a larger whole.

Milan was distinguished with a variable level of grassroots actors active in the social context, depending on the ULLs themselves and some complex approval processes when compared to the other two cities. During the unlocking step, the directorate of urban planning in the municipality of Milan, which is responsible for the local cluster partnership, called on local actors to develop NBS implementation strategies for the different ULLs areas. This helped dismantle organizational conflicts between the grassroots and the municipality and develop dialogue and interactive changes in the mapped multi-actor governance processes in the first phase of setting the UIP in Milan.

The case of Hamburg was, in contrast, characterized by a strong level of grassroots organization in its social context and a simultaneously complex institutional structure with many layers for approvals. As such, the first strategy conducted was the one of unlocking, with the aim of dismantling organizational resistances and, in many cases, delegating the decision-making power to the grassroot level. The main actions in this phase were pointing at creating and managing changes in the current multi-actor governance processes to foster improved synergies among the local urban actors.

3.2. Mobilization and Adaptation Phase Observations

During the progression of the process, it became clearer that governance networks could not all be simply designed top-down; some can be nudged and guided into existence or even emerge organically. Different pathways and multiple organizational arrangements were shown to be possible; see Figure 5. Some of these pathways were designed such that governance options were considered and weighed during the actual co-implementation (as in the Milan ULL1 case), while other parts of the overall network were either existing or emerged during the whole project period (as in the Hamburg case). The observable range of pathways includes the following:

1. Designing governance networks.
2. Creating/strengthening intra-network connections.
3. Creating/strengthening internode connections.
4. Helping to create new nodes (stakeholder groups).
5. Incentivizing co-governance networks to emergence.
6. Guiding the emergence of a co-governance network.

7. Helping co-governance networks to emerge.
8. Letting networks emerge organically.
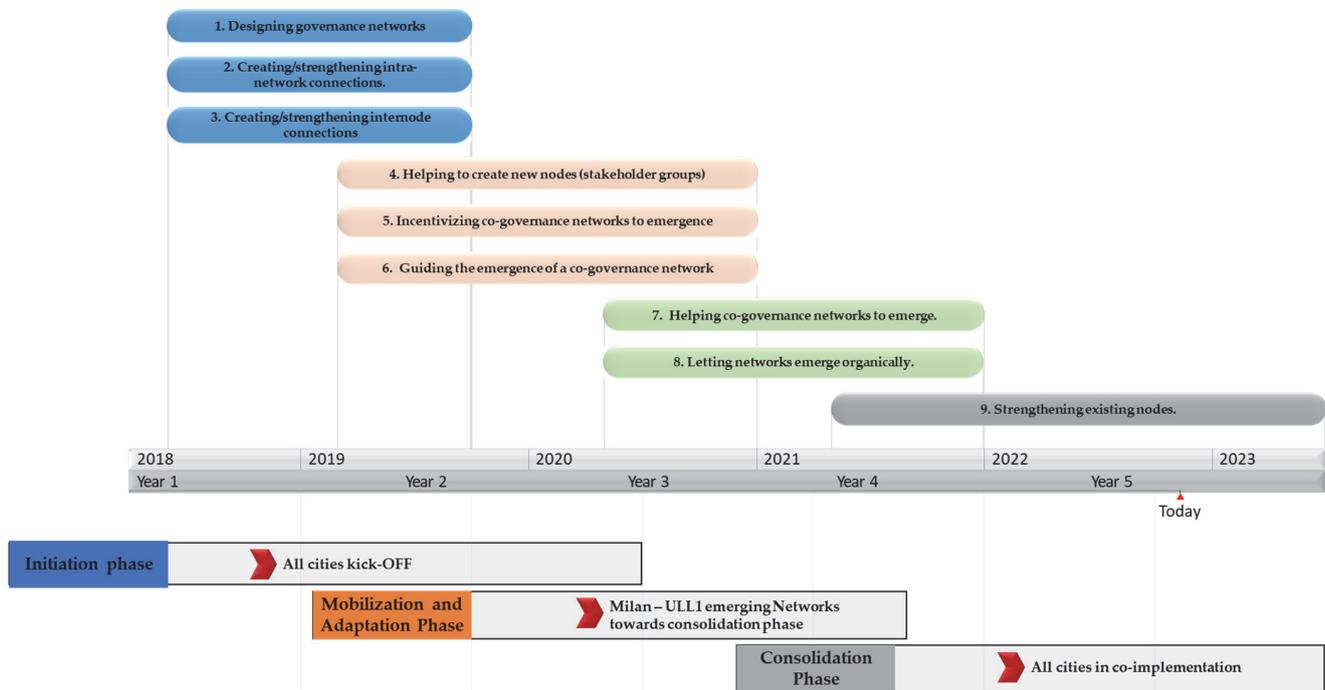9. Strengthening existing nodes.

Figure 5. Timeline of the different phases of observation along the CLEVER Cities Project and how the different pathways to network formation tended to be distributed in time. Source: The authors.

These pathways range from the intentional change network dynamics to emergent grassroots processes where community relationships gradually coalesce into more organized communities. The creation of a fully designed co-governance network to run the regeneration process, although theoretically possible, was not observed in the actual implementation in the ULLs. This may be due to the large scale of the NBS projects and the fact that they were conceived as having two levels from the beginning (i.e., UIP and CALs).

Not all these pathways were observed in each city. In Milan, for example, both incentivizing co-governance networks to emerge and helping to create new nodes happened. In ULL1, the municipality financed the implementation of green roofs and walls through public bids, and yet, it offered the private building owners' the possibility to select their design experts from a range of architects and urban planners that were affiliated with the project. This was conducted from a bottom-up perspective so that the community group could attain its objectives, but they needed the help of a specialized enabling group for organizational and other more technical issues. This can also happen by accepting an appointed lead or forming a partnership with an organization more connected to governmental processes.

3.3. Consolidation Phase Observations

In this phase, it was noted that governance networks did not converge on a single formation. In all the living labs, there was some form of polycentric system that combined interconnected, semi-independent networks. That is, there was more than one governance network, but there were connecting nodes that were common to each of them. Different governance structures (polycentric solutions) allowed networks to become more decentralized while maintaining some level of independence. By adding key connections, increased collaboration was possible.

Alterations at the scale of the node or network were important to change the dynamics of information exchange and roles. However, it was interesting to note how alterations

to intra-network relationships also provide opportunities to change decision-making dynamics and increase transparency, although their impact occurs at a different scale. That these were observed in all three of the cities indicates that polycentric solutions have been overlooked in other projects, and attention has been focused on the dominant network in the system.

In the case of some of the Hamburg ULLs, the new network configurations appointed for the implementation of the local projects were only temporarily active without really provoking change in the institutional decision-making structure. In fact, the department involved in the project was not able to overcome most of the institutional barriers with respect to other departments, which could hinder future attempts at co-creation.

In sum, the experiences from the different cities demonstrated that there are multiple pathways that lead to a range of governance networks, each of which is valid in its determined context. In large complex urban regeneration projects such as the case of CLEVER Cities, the pathways forward have tended to include polycentric solutions with inner core and outer satellite networks.

4. Discussion

The results highlight that a number of dynamics were seen to be common across all three frontrunner cities. These processes show the highest probability of being applicable to other cities and other contexts.

4.1. Governance Networks Adapt over Time

In comparing theoretical concepts and models of governance with the living lab's adaptations over time, the similarities in the three cities generally outweighed the differences. One of the main insights of the CLEVER Cities ULLs was the affirmation of the dynamic nature of local co-governance networks. Governance networks are constantly adapting as actors, goals, and relationships change. In each city, there were alterations in the organizational arrangements not only from the initial phases of the project to the end, which would be expected but also from the mid-mobilization phase to the consolidation phase as final changes and additions of stakeholders occurred. As in any management process, the system must be able to respond to shocks and changes. In the present cases, the COVID-19 pandemic altered considerably the system context, which brought most of the co-creation activities to online versions or even blocked the process for a certain period of time.

4.2. Governance Networks Can Develop along Multiple Pathways

Not only are there multiple pathways to the formation of governance networks, but there are also multiple possible typologies that reflect the inter-relationships between different agents in the network. Although there is a spectrum of typologies that span from top-down command and control to horizontal governance systems, the CLEVER Cities project demonstrates the importance of collaborative models that change the perspective of those participating by finding the middle ground. This is more critical than the individual typologies themselves and their pros and cons.

When referring to large-scale projects, it seems probable that during the project's lifetime, the different governance pathways to the development of these complex networks will occur. The main variations are designing networks, supporting and inducing changes, and, lastly, recognizing emergent tendencies and allowing these to flourish. However, there are many variations that mix and combine these main pathways. For instance, in the case of Milan, the complexity and diversity of actors in CAL1 altered the governance model of each implemented NBS project based on the building ownership group and the co-design process development [44].

These different pathways to collaborative governance support the notion that flexibility is necessary in order to respond to the context, the approach taken, and the ongoing feedback collected. Despite a single goal of developing a more collaborative environment,

the means of creating new roles and relationships in the network can be quite different. Furthermore, the process is more important than the end result.

4.3. Diversity and Adaptation in the Types of Change Is Normal

There are significant changes during the different phases of the co-creation process. Additionally, a range in the types of change was also observed. Changes to networks were observed to occur at three main scales, sometimes focusing on a strategic point while at other times involving the more significant restructuring of the roles and information exchanges. The move towards more **collaborative forms of governance networks** thus involves three main types of adaptation over time:

Changes in the **network nodes**, particularly to add in new roles that may promote, mediate, or change leadership dynamics.

Adaptations to parts of the networks, including or removing multiple nodes and connections and altering more significantly the power relationships between them.

A move towards polycentric networks that can bring in diversity and cross-perspective collaboration while maintaining some independence of the individual network groups.

All three cities showed all three types of changes. This seems to indicate that governance structures with multiple arrangements may be an apt response to the required changes to pursue community-led urban regeneration [45]. As projects have different contexts and distinct starting points, the evolution of governance networks is pathway dependent, evolving in a unique manner, but in the case of larger regeneration projects, multiple types of network change are shown to be a positive strategy. The fact that governance networks tend to include different types of adaptations (node, network, and polycentric) indicates that different governance strategies working in conjunction may be the norm.

Nevertheless, the overall goal in the cities was still to move agent relationships from extreme top-down or bottom-up positions toward the center of the spectrum to develop more consolidated levels of collaboration. From a bottom-up perspective, horizontally organized groups may consider a move toward the inclusion of an element of a hierarchical working arrangement. This would typically include accepting an appointed lead or working with a funder that has final decision-making power. In the city of Hamburg, the social housing company (SAGA) was a key driver for the implementation of the green façade in CAL2. Conversely, from a top-down perspective, this has typically represented bringing in grassroots networks into the decision-making process, as was the case in the green corridor in ULL1 in Hamburg [46]. In both cases, it involves the transition of the decision-making process towards a new relational state, where new learnings are needed for positive collective results.

4.4. Four Main Types of Roles for Nodes

When discussing changes in functions and responsibilities, there are many terms that can be utilized. These include approver, overseer, intermediary, broker, promoter, motivator, sponsor, initiator, and more see also [47]. From the analysis of the three case studies, it has been fruitful to limit these identifiers to three strategic roles plus the lead. These are gatekeeper, with a limiting or approving function; mediator, with an interest in procedural actions, such as connecting isolated actors or strengthening already existing ties in the network; and enablers, active especially in the initiation phase and/or activated during the next phases to help with management systems and other formal processes.

4.5. Intra-Network Governance Connections

It was noted above that governance networks tend to adapt and change at three main scales: the node, the network, and the intra-network, with this latter adaptation forming some type of polycentric system. When there is a move toward the creation of a polycentric governance system, strengthening intra-network connections can originate in the attempt to keep the positive aspects of a functioning network together while still adding new ideas, skills, and perspectives. In the CLEVER Cities context, this was mainly to

include community knowledge and guidance. In contrast, it can also lead to a conservative resistance to change by avoiding or postponing more radical alterations to core networks. In either case, there are a few key means by which intra-network connections are made and/or strengthened. These include:

- The formation of common nodes or stakeholders.
- Interaction points where networks come together for discussion and cooperation.
- Loose, informal connections through common meetings and social events.
- Common enablers or delegated leads that act in different networks.
- Organizational connections, either such as association or government-led connections.

Together these processes start to demonstrate the level of complexity possible in forming the loose constellation of networks that are central to collaborative governance. The CLEVER Cities ULLs demonstrate that in a few short years, significant adaption and change in governance models are possible along many paths.

5. Conclusions

The co-creation processes can act as a catalyst for the formation of new collaborative governance structures, which can lead to a transformation for the organizations involved in the process. Contrary to the commonly advocated path of moving decision-making processes to the most horizontal, grassroots state possible, it is the middle ground of shared governance typologies that offers the best balance for collaboration. It is in the middle where horizontal management blends with management skills and formalized procedures and documentation.

The CLEVER Cities project provided the opportunity to observe how people and organizations can change as co-creative urban regeneration occurs. It also demonstrated that in order to develop the correct roles, relationships, information flows, and decision-making processes, relatively complex network adaptations emerge and change at each stage within the process. Furthermore, these do not tend to lead to a singular governance network form but rather parallel developments that include role changes in network nodes, the reworking of whole sections of a network relationship, and, most interestingly, the evolution of polycentric networks. The latter is a solution that helps preserve certain network characteristics and power dynamics while adding new capabilities. In all three cities, a core network was connected to satellite networks, demonstrating a tendency for this type of project with funding from a centralized source, such as the case in CLEVER Cities.

All three Urban Innovation Partnership interventions indicate that collaborative governance cannot be simply designed at this scale. Rather, it is necessary to accept that community, private sector, and government actors will come together through a range of processes creating a complex constellation of stakeholders that will allow for the full range of participative roles. This requires a paradigm shift from purely technical thinking towards finding common ground for collaboration. Both individual actors and stakeholder groups form the connective links between networks, where community knowledge is collected and shared. Governance structures that are solely top-down and supported by control-based strategies lose their adaptative capacity, although not all decision-making is necessarily collective and non-hierarchical.

This paper argues that there are concurrently top-down, designed network formation processes and bottom-up organic social networking process that led to the hybrid complex networks found in the CLEVER Cities ULLs. Furthermore, there are many pathways toward more collaborative forms of shared governance, which will arise from the system context. As long as the process allows for change and adaptation and there is a move from the more extreme top-down or bottom-up typologies, positive transformational change will occur, and richer and more widely validated decision-making processes will start to take hold.

Finally, it is important to reinforce the importance of ULLs and to create the mechanisms by which the learnings from these contexts can be expanded, diffused, and up-scaled. Co-creation and collaborative governance are intimately entwined, and both are

core aspects of creating the transformations needed for more sustainable, inclusive, and resilient cities.

Future research will look at implemented co-governance models within the different phases of co-creation (co-implementation and co-development) that followed in order to comparatively assess a possible trend for change over time of collaborative governance towards urban transition.

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