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Guidelines for Citizen Engagement and the Co-Creation of Nature-Based Solutions: Living Knowledge in the URBiNAT Project

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Abstract: Participation and citizen engagement are fundamental elements in urban regeneration and in the deployment of nature-based solutions (NBS) to advance sustainable urban development. Various limitations inherent to participatory processes concerning NBS for inclusive urban regeneration have been addressed, and lessons have been learnt. This paper investigates participation and urban regeneration and focuses on the development of guidelines for citizen engagement and the co-creation of NBS in the H2020 URBiNAT project. The methodology first involves the collection of scientific and practical input on citizen engagement from a variety of stakeholders, such as researchers and practitioners, to constitute a corpus of qualitative data. This input is then systematized into guideline categories and serves as the basis for a deeper analysis with researchers, experts, and practitioners, both inside and outside URBiNAT, and in dialogue with other cases of participatory NBS implementation. The results highlight an ‘ecology of knowledges’ based on a ‘living’ framework, which aims to address the specific needs of various segments of citizens and to match citizen engagement to the participatory cultures of cities. Implications and further research are also discussed, with a special focus on the implementation of NBS. The conclusions broaden the research context to include the refinement of the NBS approach, with participation being seen as both a means and an end.

Keywords: guidelines; citizen engagement; co-creation; nature-based solutions; participation; urban regeneration; living knowledge; URBiNAT



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1. Introduction

The European Union (EU) has invested in research and innovation on nature-based solutions (NBS) in order to promote sustainable urban development and contribute to an evidence-based framework. The Horizon 2020 Programme on research and innovation (2014–2020) included an area dedicated to societal challenges, and financed, among other things, the implementation of innovative NBS in cities for inclusive urban regeneration, and, in particular, the regeneration of deprived urban districts [1]. These are districts which are often characterized by the presence of derelict infrastructure, environmental pollution, low employment rates, and high levels of urban poverty [2,3].

NBS is still a novel concept that is under development, and it is one that offers both challenges and opportunities [4]. As a new concept, it generates uncertainty because of a lack of operational and technical preparedness. Yet, it also brings with it possibilities for deploying new ways of addressing old problems, new and innovative approaches, and practices that are more inclusive [5]. NBS have been defined as solutions that make use of ecosystem services and nature to provide environmental, social, and economic benefits [6–8]. NBS have the potential to generate benefits for citizens and other stakeholders

in urban areas in a multifunctional way and at many different levels, from providing services, regulating and maintaining ecological balance, and generating cultural, social, and economic benefits. NBS can generate positive outcomes, such as cooling, heat avoidance, opportunities for exercise, and gathering points for citizen interaction.

NBS may, however, also have negative implications, such as allergic reactions, a sense of insecurity, or spots where rubbish is offloaded or targeted for vandalism. Implementing and managing NBS is, therefore, a complex and difficult process [9]. A recent state-of-the-art publication focusing on NBS in EU-funded projects points to other critical issues regarding the transformative potential of NBS. This relates particularly to issues of social justice, as well as to a growing body of research that suggests the potential for the exacerbation of inequalities and results that are incompatible with the objectives of sustainable communities [10].

There is widespread consensus that the participation and involvement of citizens are necessary for the planning of nature-based adaptations [8]. Citizen involvement is said to increase fairness, relevance, acceptance, and sustainability [11–13]. Co-creation procedures and polycentric governance, with the inclusion of a variety of stakeholders, are also seen as more effective in the management of public assets. NBS projects are also said to benefit from collaborative governance models, something that the EU also greatly encourages [14].

Despite a generalized agreement that citizen involvement is both necessary and positive, empirical evidence showing that it supports NBS in ensuring a transformative and continuous change in cities is scarce [15–17]. Xiang, Yang, and Li [18] also argue that there is a dearth of research on what ‘features’ the regeneration projects that reflect inclusion should have, and how urban regeneration should be implemented. The authors are proposing a concept of ‘inclusive urban regeneration’, combining NBS with society-based solutions. Central to this concept is the notion of effective and sustainable forms of public participation in inclusive urban regeneration [19]. Thus, inclusive urban regeneration is a topic that has been deemed worthy of further investigation [18].

Frantzeskaki [20] discusses several points when it comes to participation and NBS in cities. Trust is emphasised as important in every participatory process that has to do with policy, planning, and experimentation. Clarity, transparency, and openness are also central to the trust-building process. Furthermore, diversity and learning from social innovation are emphasized as central to the co-creation of NBS, and Frantzeskaki [20] also states that an inclusive narrative can enable the integration of many urban agendas.

Furthermore, face-to-face communication has been identified as the greatest factor in increasing the likelihood of cooperation [21,22]. The Internet and modern communication technology have created the potential for blending the advantages of face-to-face interaction with online communication [21,23]. Social media also offers benefits by delivering synchronous and interactive communication between governments and citizens, bringing new impetus to citizen engagement [23–26]. To achieve successful citizen engagement, it is also important to be aware of the tools citizens use, including digital tools. In general, people marginalized by income and education more often depend on a smartphone than a PC for Internet access [27].

The European Commission report on the state of the EU-funded NBS projects also raises critical issues concerning participation and inclusion [10]. It warns of the limitations of co-design and co-production processes, such as in the case of participatory methods that are exploitative and that legitimize solutions that provide little contribution to the needs and ambitions of the communities [10].

To summarize the discussion so far, participation and citizen engagement are perceived as elements that are fundamental to urban regeneration and to the deployment of NBS for the advancement of sustainable urban development. When it comes to participation and NBS in cities, some ideas have been suggested (e.g., [20]). There is, however, a lack of evidence on how to arrive at successful citizen engagement, given the various limitations of the participatory processes using NBS for inclusive urban regeneration that

have been looked at [10]. All in all, there is a scarcity of research on participation and citizen engagement concerning NBS and urban regeneration [8].

The approach taken in Horizon 2020 holds that solutions based on nature can regenerate disadvantaged neighbourhoods, for example, by reducing urban violence and social tensions through better social cohesion [1]. It also promotes the adoption of a project model in which cities are given a role in order to enable them to facilitate the rapid exploration, replication, and scaling up of solutions. Moreover, solutions could benefit from being co-designed, co-developed, and co-implemented in a transdisciplinary multistakeholder participatory context, involving a variety of stakeholders, such as residents, local authorities, community groups, companies, academics, and local communities [1].

Participation is, therefore, a critical and challenging research and policy agenda for the European Commission within the framework of EU-funded NBS projects [10], of which many have been launched since 2016. These projects have been contributing to the knowledge production around citizen engagement and the co-creation of NBS in different contexts, and have been both theoretical and practical, taking the form of research as well as the development of different tools, such as handbooks (e.g., [28]) and knowledge platforms (e.g., [29]). Moreover, the European Commission has been promoting clustering activities to maximize the impact of the Horizon 2020 and Horizon Europe programmes, bringing together EU-funded NBS projects by means of task forces in order to explore the development of joint guidelines on the co-creation of NBS [30].

This paper investigates the development of guidelines for citizen engagement and the co-creation of NBS in the URBiNAT project. It looks at the ‘ecology of knowledges’, as termed by Boaventura de Sousa Santos [31,32], that has been emerging inside and outside the project, and works towards the creation of a ‘living’ framework. This ‘living’ framework will be used to address citizen engagement and NBS co-creation on the basis of local and specific priorities, contexts, and challenges, thereby ensuring that the specific needs of the various segments of citizens are addressed, and matching citizen engagement to the participatory cultures of cities. In this regard, as developed by Ferreira in conceptualizing URBiNAT methodology to map local participatory cultures, it is not only about the formal participation of citizens in urban governance, but also about the participation of citizens in other kinds of collective initiatives, in a diversity of formats, both physical and digital [33,34]. It is important to understand how participation works locally, as well as to assess the challenges and opportunities involved in the engagement of citizens and stakeholders as a baseline for public liveability in neighbourhoods and the design of participatory processes [35]. Identification of the conditions needed for active, positive, and ethically sound participation paves the way for new experiments with different features and effects, as well as for finding specific anchors in the social fabric and its institutions.

URBiNAT is a project funded within the Horizon 2020 programme, centring on innovative NBS in cities for inclusive urban regeneration. Its acronym stands for ‘URban Inclusive and Innovative NATure’. The five-year project (2018–2023) focuses on the urban regeneration of deprived city neighbourhoods through the co-creation of healthy corridors made up of a combination of NBS. Central to the project is the co-creation of NBS within and between different neighbourhoods, working together with citizens and other stakeholders. Having the physical, mental, and social well-being of citizens as its main goal, URBiNAT aims to co-diagnose, co-design, co-implement, and co-evaluate healthy corridors in the form of innovative and flexible NBS, integrating several ‘micro NBS’. Healthy corridors are being co-created in the European cities of Nantes (France), Porto (Portugal), Sofia (Bulgaria), Siena (Italy), Nova Gorica (Slovenia), Brussels (Belgium), and Høje-Taastrup (Denmark). Moreover, through its Community of Practice, which includes non-EU observers, work carried out in URBiNAT is also being followed in Iran, Brazil, China, Oman, Japan, and Cyprus [36].

The URBiNAT consortium is coordinated by the Centre for Social Studies of the University of Coimbra (CES-UC), based in Portugal. The CES-UC is a scientific institution focused on research and advanced training in the social sciences and humanities, through

an inter- and transdisciplinary approach, and with a particular focus on the North–South and South–North dialogues [37]. This reinforces how the URBiNAT Community of Practice incorporates social sciences together with the diversity of its consortium partners to better understand and contextualize the development of solutions, given that the involvement of the social science and humanities disciplines in dialogue with other disciplines is required to adequately deal with complex societal challenges, thus fostering social innovation [1].

URBiNAT is of special relevance and interest in the context of the present study for three main reasons. The first reason is tied to the novel approach of URBiNAT to NBS, with its focus on four types of NBS: Territorial NBS, Technological NBS, Social and Solidarity Economy NBS, and Participatory NBS, with a particular focus on the inclusion of the last two. The inclusion of Participatory NBS as a category of NBS in its own right is based on the assumption made in URBiNAT that participatory activities create various benefits for citizens and other stakeholders, improve collaboration within communities, and empower individuals in the decision-making process. Participatory NBS are seen as both a means (to develop the co-creation process) and an end (helping to activate citizenship) [33].

Secondly, URBiNAT is of interest because extensive work has been carried out on exploring and identifying the categories of the significant factors impacting citizen engagement in urban regeneration and the co-creation of NBS, leading to the development of guidelines. Thirdly, URBiNAT is relevant and interesting in the context of the present study because of its focus on deprived urban districts, where the need for inclusive urban regeneration is especially acute [1], and where participation and co-creation come with certain hurdles. The NBS developed in URBiNAT address local issues in deprived urban areas, such as poverty and unemployment, problems with health, crime and vandalism, cultural differences and conflicts, and low-quality housing and infrastructure [38]. URBiNAT has been focusing on the specificities of these neighbourhoods, with reference to ethics requirements and a rights-based approach [33,39].

This paper is structured in the following way: the next section, ‘Materials and Methods’, describes how the guidelines for citizen engagement and NBS have been developed. The results are then presented as an overview of the guidelines around key categories, and how they add value as a ‘living’ framework, namely, concerning the emergence of learning points for the co-creation of NBS. Subsequently, in the ‘Discussion’ section, the results are evaluated in relation to previous research, and implications and further research are considered. A particular focus is given to the development of the understanding of the different dimensions for designing and implementing NBS, especially in times of COVID-19, and to addressing issues of exclusion. Lastly, in ‘Conclusions’, the research context of the NBS approach is widened, with participation being looked at as both a means and an end.

2. Materials and Methods

2.1. Initial Input on Citizen Engagement

URBiNAT sees inclusive urban regeneration as a process that goes beyond the usual practice of urban planning, working within a collaborative framework to bring together many different stakeholders, including citizens, municipal officials and public servants, researchers, practitioners, local partners, and other stakeholders. As a result, it comprises a diversity of sectors, both public and private, as well as a third sector that includes public services, local businesses, social enterprises, voluntary organisations, grassroots movements, collective initiatives, and local civil society [33]. To go beyond the ‘usual suspects’ in urban planning (i.e., those individuals, groups, and associations/organizations who always participate, and who are more engaged in terms of availability and professional/disciplinary skills) means to fundamentally focus on the engagement of the widest possible range of citizens, at all stages of the co-creation process, to identify assets, needs, challenges, opportunities, and ambitions. This is conducted in order to design and implement solutions provided by citizens, encouraging them to take ownership, and then monitoring the results and impacts of their actions.

URBiNAT promotes a type of regeneration in which participation is fundamentally valuable as a process in its own right. The aim is to activate citizenship, in the sense of empowering people within their own demo-diversity or within different democratic models and practices [40], enabling them to choose solutions more adjusted to their diverse interests, agendas, and needs [33]. Participation is regarded both as a means of achieving the objectives of co-creating solutions, and as an end in an ongoing process based on the development of the participants' capacities to engage in collective initiatives and expand their role as active citizens [33].

At the heart of inclusive and innovative urban regeneration, participation is included in the URBiNAT NBS catalogue in the form of Participatory NBS [41]. The URBiNAT catalogue challenges the conventional definitions of NBS with the integration of solutions inspired by nature, such as Territorial and Technological solutions, comprising products and infrastructures, together with Participatory solutions and Social and Solidarity Economy solutions, comprising processes and services [42]. Material and immaterial solutions are presented together in the URBiNAT NBS catalogue, with the aim of balancing their position in the public space and pushing forward the perception that material solutions do not produce urban regeneration without immaterial solutions [33,43]. It is also a symbolic statement and a reminder to attribute the same relevance to both in terms of investments in time, energy, and budget [33].

If Xiang, Yang, and Li are proposing a concept of 'inclusive urban regeneration', combining NBS with society-based solutions [18], URBiNAT, in turn, inserts participation and the social and solidarity economy into the framework of NBS in search of societal harmony with nature. Conceptualizing participation as NBS gives it visibility as a fundamental natural solution to the reintegration of nature in the public sphere and space by overcoming the artificial separation of humans and nature [44]. The social and solidarity economy is one of the pillars of the URBiNAT approach to urban regeneration and the identification of new partnerships and forms of financing, as well as to the introduction of the innovation cycle in order to generate new products in response to concrete social problems [45]. It also requires an understanding and uptake of the meanings and opportunities of solidarity networks as a new way of producing, consuming, and living in which solidarity is at the heart of life, promoting development that is ecologically sustainable, socially just, and economically viable [46].

Citizen engagement and the community-driven processes implemented within the project are aimed at both contributing to the enablement of solutions for the design of the urban fabric, as well as constituting, in themselves, solutions that aim for social cohesion, as defined by Manca [47]. Participatory NBS are solutions that contribute to the fostering of social cohesion, being related to connectedness and solidarity among groups in society. They are also social processes designed to enable social cohesion that, in turn, makes room for the plurality of citizenship. Moreover, co-creation in URBiNAT embodies a strategic participatory approach aimed at tackling inequality, socioeconomic disparities, and fractures in society. The same approach applies to Social and Solidarity Economy solutions.

The URBiNAT NBS catalogue is based on an initial collection of several NBS, in accordance with the knowledge, expertise, and research carried out by URBiNAT partners. The first version of the catalogue was compiled during the project proposal phase but has since evolved from the launch of the project and throughout the co-creation process. It constituted an initial input and inspiration for co-creation with citizens and stakeholders, and it currently constitutes a 'living' NBS catalogue that has grown, is growing, and will continue to grow during the implementation of the project [44]. Being 'living' is an essential characteristic of the URBiNAT NBS catalogue as it needs to be flexible and adaptable to the different features of local physical and sociocultural contexts, as well as to the needs and wishes of citizens, including the solutions proposed by them [44]. The URBiNAT NBS catalogue is, therefore, subject to ongoing review in order to take account of the developments in the field. The results of the co-creation process, from the engagement to

the co-design, co-implementation, and co-monitoring are evaluated, as they depend on learning and feedback activities so that improvements can be implemented [44].

In the first few months of the project, URBiNAT partners brought together different perspectives, expertise, and experiences in the academic, technical, and political fields to establish the theoretical and methodological foundations of the project, including in the area of citizen engagement. The partners, members of URBiNAT advisory boards, as well as other researchers and practitioners, were invited to participate in their specific areas of expertise in a set of webinars centring on the topics that shape the main pillars of the URBiNAT approach to urban regeneration. The webinars were followed by written contributions from speakers, reflecting their views and taking into account the discussions following their presentations. They were also asked to include guidelines in their written contributions to support the finetuning of a reference and methodology framework to guide the community-driven processes in URBiNAT.

Contributions on citizen engagement focused on: the relationship between citizenship rights and inclusive, active, and culturally diverse participation in processes of urban regeneration; participation in the practice of cities, contextualized within the framework of their urban governance; co-creation processes, platforms, and tools to support them, and the role of co-creation versus co-production; the participation of the private and third sectors in the lifetime of NBS; and the monitoring and evaluation of the participatory and co-creative processes [48].

2.2. Systematization into Categories of Significant Factors Impacting Citizen Engagement

On the basis of these initial written contributions on citizen engagement, the members of the URBiNAT working group on participation have been further exploring the combinations of expertise of the consortium partners, which constitute an initial corpus of qualitative data, through a two-step process [33].

The first step consisted of extracting and organizing guidelines into categories for participation in urban regeneration processes as a qualitative data analysis in order to explore meanings, both manifest and latent [49]. The contents and contributors were referenced in each category. In methodological terms, within the framework of the Step 1 (extract and organize) codification processes [50,51], a process of continuous inductive reconfiguration took place upon analysis of the contributions on citizen engagement. The objective of the analysis performed was to map the patterns and characteristics common to various types of content produced by diverse actors (practitioners, researchers, and municipal staff), where participation is the subject of specific practices, projects, and policies.

This resulted in the identification of the strategic and operational dimensions of the guidelines, which were grouped into twenty initial categories: Citizenship rights; Innovation cycle; Regulation; Governance; Inclusion; Trust; Co-production; Cultural Mapping; Behavioural changes; Intensity and levels of participation; Communication and interaction; Facilitation; Transparency; Quality of deliberation; Where; When; Supportive methodologies and techniques; Integration of the results of participatory processes; Private sector; and Monitoring and evaluation. On the basis of the results of the inductive analysis, a review was carried out in the second step. It consisted of reviewing and aggregating the guidelines by identifying and elaborating on the overlaps and contradictions, as well as identifying missing elements and raising additional aspects to be further explored in some of the categories. It also resulted in the addition of the category: Risk assessment and mitigation measures.

Step 2 also reviewed the inclusion of ethics as a requirement of the research and participatory activities involving people, and the human rights and gender considerations as cross-cutting dimensions of the project. Both the ethics requirement and the human rights and gender considerations—cross-cutting dimensions in URBiNAT—underpin citizen engagement and the co-creation of NBS, which can contribute to tackling a complex combination of societal challenges in the context of urban regeneration [33,39]. Indeed, a

multiplicity of cultural and socioeconomic aspects are present in the URBiNAT neighbourhoods, including vulnerable individuals and groups. These are identified throughout the co-creation process, so that the participatory activities can make use of strategies tailored to the specificities of people and groups, as referred to in the URBiNAT Code of Ethics and Conduct [33,52].

In its principle guidelines on ethics, URBiNAT defined specificities according to childhood, gender (including gender minorities/diversity), older adults, race and ethnicity, functional diversity, citizenship status (migrant/refugee/asylum-seeker conditions), and religious diversity [52]. URBiNAT has also established a framework for a rights-based approach on the basis of the preliminary guiding principles, with special attention to gender analysis, to be integrated into all phases of the project activities. These range from planning, formulation, and implementation all the way to assessment [39,53,54]. The URBiNAT framework for a rights-based approach comprises the following guiding principles: (i) People as citizens; (ii) Full citizenship; (iii) Applying all rights; (iv) Participation and access to the decision-making process; (v) Nondiscrimination and equal access; (vi) Inclusivity; (vii) Accountability; (viii) Transparency and access to information; and (ix) 'do no harm' [39,54]. The URBiNAT ethical code of conduct for the communication and dissemination of activities mirrors these principles [55].

In the systematization of the significant factors impacting citizen engagement and the corresponding development of guidelines, the URBiNAT working group on participation has not created specific categories with regard to ethical or human rights and gender issues. Instead, it has introduced references to ethics requirements and a rights-based approach throughout the guideline categories, in line with the URBiNAT cross-cutting approach to making these issues integral to the project. In practical terms, the cross-cutting dimensions are theoretical lenses, guiding principles, and methodological frameworks to be adopted by URBiNAT partners and stakeholders for all activities, and across all work packages [39].

2.3. Sharing and Learning with Practitioners from the Field, Inside and Outside URBiNAT, towards Living Knowledge

In addition to being based on the experiences of the diverse partners that make up its consortium, the methodological and practical developments achieved by URBiNAT are advanced by the sharing of best practices and knowledge, particularly relative to URBiNAT cities and their specific situations. The analysis, carried out as an internal exercise relative to Steps 1 and 2, was followed by a broadening dialogue in order to enrich the gathering of input and the feeding and reframing of the categories and the related guidelines. It served as a basis for a deeper analysis with researchers, experts, and practitioners in the field of participation, both inside and outside URBiNAT.

This dialogue began on the occasion of an external workshop conducted by the URBiNAT working group on participation during the Open Living Lab Days (OLLD) in September 2019, organized by the European Network of Living Labs (ENoLL) in Thessaloniki (Greece). The OLLD is an annual event that brings together the global Living Lab community, made up of public officials, companies, entrepreneurs, academics, living lab representatives, and innovators [56]. The participants of the workshop were asked through an online polling tool (Mentimeter) to rank the URBiNAT categories. This first prioritization enabled the URBiNAT working group on participation to direct the discussion and developments of the review to specific categories, as these were the most critical aspects of citizen engagement in different contexts.

Subsequently, the URBiNAT working group on participation shared the categories that are based on the guidelines and its ranking, which emerged from the workshop held at the OLLD in a series of three internal interactive sessions/online meetings by means of discussion, experience sharing, and feedback. The invited participants have deep knowledge and sound expertise gained from citizen participation in the intervention areas of the project, as they are either employees of the municipality, or of the agency in charge of the management of social housing, or they work for nonprofit organisations. The following questions framed the discussions: What is missing? What is most relevant

to your practice? Why? For what kind of situation? For what kind of people? How is it useful? How does it relate to your city? What are the main challenges you experience concerning these categories? What best practice could you share? This exchange resulted in support for the refinement of categories, including the addition of four more categories: Ownership; Culture of participation; Why participation; Mediation.

Moreover, if the experiences of URBiNAT cities can inspire each other through networking and training, other means are also being explored for further inspiration through both large and small participatory cases. Since January 2020, the leader of the URBiNAT working group on participation has been promoting internal exchanges around interesting participatory cases, both from URBiNAT cities as well as from additional examples from other cities, where citizens take an active role in making their city or district a better place to live. The samples were chosen on the basis of their successfully achieving a broad and diverse engagement of citizens and stakeholders in NBS co-creation, and their relevance for deprived neighbourhoods in cities. Furthermore, cases were selected that fit into the four categories of NBS used within URBiNAT. For URBiNAT and professionals working with citizen engagement, it is an interesting study into what can be achieved when citizens and other stakeholders work together to create new opportunities and a better future for their community.

More specifically, the good practice study of citizen participation, based on already established NBS solutions, includes the mapping of more than 100 examples of best practices that all have the potential to create positive results in deprived neighbourhoods. These examples were presented on the URBiNAT online work platform in a blog that provides the URBiNAT community with the opportunity to comment and reflect. From the discussion promoted internally on the URBiNAT online work platform, several preliminary learning points are emerging that can be linked to the guideline categories for citizen engagement.

Finally, the URBiNAT project has joined the framework of the European Commission's clustering activities to maximize the impact of the Horizon 2020 and Horizon Europe programmes, and, since 2020, has been leading a task force on co-creation and co-governance (Task Force 6), engaging EU-funded NBS projects launched since 2016. With the support of NetworkNature, one of the aims of this task force is to co-develop joint guidelines on the co-creation and co-governance of NBS [30].

The collective and participatory pathway to knowledge production is described in the section of 'Materials and Methods' that accounts for the development of living knowledge, which emerges from an ecology of knowledges both inside and outside URBiNAT's consortium, supported by a qualitative focus [32]. The ecology of knowledges promotes the active coexistence of knowledges with the assumption that all of them, including scientific knowledge and the knowledge of other practitioners, can be enriched through dialogue. Consequently, this process is not only a means to, but also an end for engaging different actors, knowledges, and experiences.

The ecology of knowledges is tied to the intercultural translation of the diversity of knowledges that emerges from sharing and learning [32]. If the ecology of knowledges identifies the main bodies of knowledge that might highlight important dimensions, it must be completed by an intercultural translation, which is aimed at enhancing reciprocal intelligibility without dissolving identity. In practical terms, this means identifying complementarities and contradictions, common grounds and alternative visions, and developing new hybrid forms of cultural understanding and intercommunication [32,57], as living knowledge to be further developed with citizens and other stakeholders, including the NBS concept itself.

3. Results

The following subsections start with an overview of the 25 guideline categories that emerged from the systematization and review. This framework addresses participation in urban regeneration, particularly with regard to NBS co-creation projects, such as URBiNAT.

It highlights the significant factors impacting citizen engagement—the core leverages/key ingredients for successful citizen engagement.

Secondly, we elaborate on the relevance and added value of a ‘living’ framework of guidelines for citizen engagement and the co-creation of NBS, based on sharing and learning with practitioners from the field, which reveals a variety of priorities according to the situation and the diversity of practitioners. This process of sharing and learning also reveals the need to combine and tailor the categories of the guidelines to ensure that the specific needs of the various segments of citizens are addressed, and to match the activities of citizen engagement to the participatory cultures of cities.

Thirdly, we have analysed the participatory implementations of NBS with relevance to deprived areas and have integrated the core leverages for citizen engagement with the learning points that emerged. This reveals that sharing and learning from different contexts may inspire further developments of the categories and the corresponding guidelines, such as those concerning challenges, lessons learned, and best practices. This is also in line with the aim of the clustering activities with other EU-funded NBS projects, as the research, testing, and validation of URBiNAT guidelines will continue within the task force dedicated to co-creation and governance.

3.1. Overview of Guideline Categories for Citizen Engagement

Table 1 gives an overview of the initial URBiNAT framework, which addresses participation in the processes of urban regeneration. This framework highlights the significant factors impacting citizen engagement—the core leverages/key ingredients for successful citizen engagement—as well as the interrelations between them. Further details are given in Table A1 of Appendix A, which includes the combination of a strategic overview with operational details, and more information on practice-related impacts. The guideline categories that emerged from the systematization and two-stage review process are marked in light grey in the case of Step 1—extracting and organizing—and in medium grey for Step 2—reviewing and aggregating. The additional categories resulting from sharing and learning with practitioners from the field are in dark grey. The details presented in Table A1 of Appendix A arose from an analysis of the results of both the systematization and the two-stage review process, and the sharing and learning with practitioners from the field, both inside and outside URBiNAT.

Table 1. Overview of the initial URBiNAT framework on guideline categories addressing core leverages for successful citizen engagement in the co-creation of nature-based solutions (NBS).

Categories of Guideline ¹	Prioritization ²	Overview of the Categories	Impact of Other Categories
Communication and interaction	1	Communicating specificities for interacting with citizens.	Trust
Behavioural changes	2	Instigating behavioural adjustments, or changes in behaviour, in some particular respect.	Communication and interaction
Trust	3	Improving or creating relationships of trust between citizens, and between citizens and city staff, politicians, and other agents.	Transparency, Inclusion, Communication and interaction, Governance
Co-production	4	Stimulating and improving the co-production of public services, participatory processes, and product development.	Trust and Behavioural change
Inclusion	5	Having specific guidelines to guarantee the inclusion of diversity.	Citizenship rights, Governance, Transparency, Regulation
Regulation	5	Clarifying rules and regulations for equal rights in the expression of visions and priorities.	Governance, Transparency, Trust

Table 1. Cont.

Categories of Guideline ¹	Prioritization ²	Overview of the Categories	Impact of Other Categories
Governance	6	Balancing interactions among citizens, city staff, politicians, and other agents.	Trust, Transparency, Culture of participation
Innovation cycle	7	Adopting processes of rupture and searching for alternative solutions in order to address concrete social problems.	Citizenship rights
Transparency	8	Arguments for encouraging efforts to act in a transparent manner.	Trust, Governance, Why participation, Monitoring and evaluation
Intensity and levels of participation	8	Setting different approaches and levels of participation depending on the goals and real conditions for participation.	Culture of participation
Citizenship rights	9	Broadening the meaning of the appropriation of social, urban, political, and cultural rights, both internally in the collective imagination, and externally in rejuvenated relationships with local powers.	Inclusion
Cultural mapping	10	Articulating and making visible the multilayered cultural assets, aspects, and meanings of a place.	Inclusion, Innovation cycle, Supportive methodologies and techniques
Facilitation	-	Having specific guidelines to address facilitation that include other participatory guidelines.	Supportive methodologies and techniques
Quality of deliberation	-	Setting a meaningful deliberation process.	Regulation, Governance, Citizenship rights, Facilitation
Where	-	Having guidelines for the spaces in which the participatory events are held.	Communication and interaction, Facilitation
When	-	Identifying the best moment for the participatory events.	Communication and interaction, Facilitation
Supportive methodologies and techniques	-	Using specific methodologies and guidelines to support mobilization and inclusivity.	Communication and interaction, Facilitation, Cultural mapping
Integration of the results of participatory processes	-	Enlarging the scope of co-creation to validate the ideas developed.	Communication and interaction, Facilitation, Supportive methodologies and techniques
Private sector	-	Mapping the relevant private sector actors with interests in, and input to, the NBS targeted area.	Co-production, Innovation cycle
Monitoring and evaluation	-	Addressing the monitoring and evaluation of the participatory processes.	Transparency, Ownership
Risk assessment and mitigation measures	-	Identifying the factors influencing the co-creation processes, as well as those leading to the failure of co-creation and co-production.	Monitoring and evaluation, Transparency
Ownership	-	Citizens having ownership of both problems and solutions.	Trust, Communication and interaction
Culture of participation	-	Enabling regular interaction with citizens, and increasing the culture of participation.	Governance, Intensity and levels of participation
Why	-	Being clear as to why we need to engage citizens and support participatory processes.	Transparency, Intensity and levels of participation
Mediation	-	Dialogue and collaboration.	Communication and interaction, Trust, Facilitation

¹ Categories that emerged from both the systematization and two-stage review process of URBiNAT guidelines for citizen engagement, and the sharing and learning with practitioners from the field in URBiNAT cities: categories that emerged from Step 1 of systematization (extract and organize) are in light grey; those from Step 2 (review and aggregate) are in medium grey; additional categories that resulted from sharing and learning are in dark grey. ² Prioritization of guideline categories by members of the global Living Lab community, in which the 10 most critical aspects of citizen engagement are ranked. This was the result of an external workshop conducted by the URBiNAT working group on participation during the Open Living Lab Days in September 2019, organized by the European Network of Open Living Labs (ENoLL) in Thessaloniki (Greece).

Moreover, the right-hand columns in Table 1 below, and Table A1 of Appendix A, account for the practice-related impacts in the sense of interdependent categories. They highlight a greater focus on a specific category or specific categories while not excluding the others, whose relevance and connection depend on the practical context and stage of citizen engagement. Further practical-related impacts can emerge and complement this initial framework as living knowledge.

Prior to conducting an interactive review with practitioners from the field in URBiNAT cities, a workshop was held with members of the global Living Lab community—practitioners from outside the project. This resulted in the 10 most critical aspects of citizen engagement, in the form of guideline categories and ranked in order of priority, as shown in the second column of Table 1:

- At the top of the ranking are: (1) Communication and interaction (16% of participants suggested this category), (2) Behavioural changes (14%), and (3) Trust (12%);
- In the intermediate position are: (4) Co-production (10%), (5) Inclusion (9%), as well as visions and priorities, i.e., Regulation (9%), and (6) Governance (8%);
- The lowest ranking categories include: (7) Innovation cycle (6%), (8) Transparency (5%), as well as the levels and conditions of participation, i.e., Intensity and levels of participation (5%), (9) Citizenship rights (4%), and (10) Cultural mapping (2%);
- Categories not scored/prioritized by participants include: Facilitation, Quality of deliberation, Where, When, Supportive methodologies and techniques, Integration of the results of participatory processes, Private sector, and Monitoring and evaluation.

This initial framework of 25 guideline categories continues to be used as a basis for deeper analysis within the project, alongside researchers, experts, and practitioners in the field of participation, both inside and outside URBiNAT, such as in the cases of clustering activities with other EU-funded NBS projects and other participatory cases.

3.2. Relevance and Added Value of 'Living' Guidelines for Citizen Engagement and NBS Co-Creation

Beyond the addition of more categories (Ownership, Culture of participation, Why participation, Mediation), sharing and learning with practitioners from the field in URBiNAT intervention areas resulted in a feeding into and a reframing of the categories and their guidelines on the basis of the following questions: (i) What—what is missing and what is most relevant, including challenges and best practices? (ii) Why—the reasons behind what, related to types of situations and people; (iii) How—how it is useful and related to the specific context of cities?

During the internal interactive sessions, these practitioners confirmed the importance of the categories at the top of the ranking made by members of the Living Lab community, and they also highlighted that some are more critical to their specific local context. This is the case of Communication and interaction, as even though all interaction is digital now, what works is very local and hands-on (e.g., circulating sheets of paper and putting up posters is more appropriate than digital tools in some contexts, or the use of digital tools/social media, such as Facebook and WhatsApp, is limited to the incentivizing of doing stuff together) [23]. Moreover, beyond confirming that all categories are interconnected in the engagement of citizens, the practitioners from the field in the URBiNAT cities also indicated that some of the categories are more specifically intertwined, which may also correspond to local specificities, such as in the case of Transparency and Trust.

Some of the categories may not have been prioritised because they can be characterised as subsets of other more comprehensive guideline categories. As such, Facilitation, and Quality of deliberation can be seen as subsets of the more comprehensive Communication and interaction. This is also perhaps the case for Supportive methodologies and techniques. The Where and When are relevant for certain specific NBS projects, where the timing and location of the engagement process are particularly important. The Integration of participatory process results and Monitoring and evaluation concern the reflections on what needed to improve. Perhaps practitioners, in particular, are focusing on guideline categories

that activate citizens and less on the overall impact. Furthermore, NBS development is primarily seen, rightly or wrongly, as a co-creation task between city administrators and citizens. However, many examples have shown that, when these two groups are joined by the private sector and associations, significant value can be added to the process and outcomes.

Another important contribution from the interactive review with practitioners in the URBiNAT cities relates to how guideline categories can be combined and tailored to address the specific needs of the various segments of citizens, with the aim of bringing people together. While certain categories are at the core of citizen engagement, others represent methods/tools/ways of improving citizen engagement, and still others take the form of the preconditions/elementary conditions that enable citizen engagement. This is illustrated in Figure 1 below, which shows the interconnections and ties between the categories of guidelines. However, this also means that general guidelines cannot be applied to citizen groups with different needs, for whom certain elementary conditions are not met.

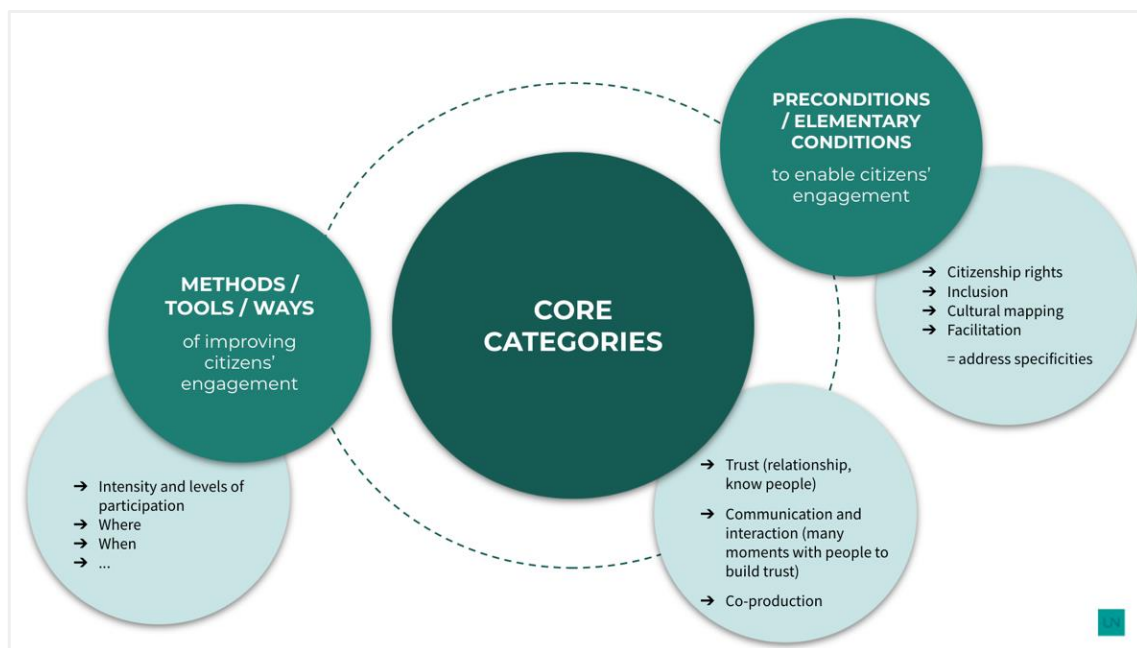


Figure 1. Interconnecting and organizing categories of guidelines to address the specific needs of the various segments of citizens.

As pointed out by practitioners in the URBiNAT cities, the local application of guidelines needs to be organized in accordance with specific challenges, namely, with reaching specific segments of citizens and keeping engagement simple and close to people's daily lives. This is all the more relevant in the case of NBS co-creation for deciding where and how to conduct specific interventions. Examples include the diagnosis and identification of problems, going beyond the sole intervention of the public sector or the focus on bureaucratic aspects.

Further research is therefore needed to deepen the categorization of the guidelines and to understand the timing and contexts involved in their application. This is particularly pertinent relative to the participatory cultures of cities and their specific challenges. The tailoring of participatory methods is informed by the local culture of participation, i.e., how participation works locally, by understanding and identifying the potential participants in co-creation, and by being able to assess the challenges and, especially, the opportunities for the engagement of citizens and stakeholders [33,35]. These specificities cannot be captured in a generic consultation, such as the one conducted with members of the Living Lab community through the ranking of the 10 most critical aspects of citizen engagement. It would need to be informed by research work on the local culture of participation, not only

to look at the formal participation of citizens in urban governance, but also to consider the participation of citizens in other kinds of collective initiatives—ones that contribute to finding specific anchors in social fabrics and institutions, paving the way to new experiments with different features and effects, and which must also be included. For example, URBiNAT has mapped the local participatory culture in order to devise community-driven processes, which are the results of collectively designed strategies [33–35]. The research work consists of identifying and collecting a wide variety of data and documentation, organizing workshops, holding formal and informal meetings, and conducting semistructured interviews [33–35].

URBiNAT guideline categories offer an initial framework with which to address core leverages for successful citizen engagement in the co-creation of NBS, in accordance with local and specific priorities, contexts, and challenges. It is a ‘living’ framework in the sense that it makes room for co-creation in terms of combining participatory approaches and methods. It also constitutes a ‘living’ framework, with its categories being reviewed, discussed, and enriched through an ongoing process of sharing and learning. Advances will also be achieved with the help of the perspectives of citizens and other stakeholders engaged in the URBiNAT intervention areas. During the implementation of NBS projects based on co-creation, the engagement of citizens and stakeholders can further inform and inspire ways and tools to trigger engagement, as these groups have direct knowledge of the local participatory culture. In community-driven approaches, the inhabitants and stakeholders of the intervention areas can reveal strengths, weaknesses, and gaps in interaction that will guide the design of participatory processes, that is, the decisions on where to invest time, energy, and resources, which would feed a sustainable co-creation process.

Applying the lenses of the ethical requirements and human rights and gender, which have been mainstreamed in the URBiNAT guideline categories, is of particular relevance in this respect as it contributes to the unveiling of deep-seated inequalities that need to be overcome. It is also helpful to the design of strategies that promote respect for diversity, the acceptance of complexity, and improved conditions for participation [39], which corresponds to addressing the preconditions/elementary conditions to enable citizen engagement.

Given the research into participation and urban regeneration taking place in URBiNAT, learning points have been emerging in dialogue with participatory cases, both inside and outside the project, paving the way for further discussion and the development of a ‘living’ framework with which to address citizen engagement and NBS co-creation, as well as contributing to an evidence-based framework.

3.3. Emerging Learning Points in Relation to NBS Co-Creation

Now that more than 100 participatory implementations of NBS with relevance to deprived areas have been mapped, and the existing designs and implementations in the URBiNAT frontrunner and follower cities have been studied, several preliminary learning points have emerged that can be linked to the guideline categories for citizen engagement [33,35,58] and adaptation [20]. Some examples are provided in Table A2 of Appendix B, which reports that citizen engagement in the co-creation of NBS results in:

- NBS that are aesthetically, socially, economically, and charitably appealing to citizens and stakeholders;
- New urban spaces where people with common interests can regularly gather and engage;
- NBS diagnostics, design, and implementation relying on a community of stakeholders;
- Strong common projects between actors with different organisational goals as the propellers of social innovation;
- Inclusive and multistakeholder governance as a result of a collaborative approach;
- Bridging differences through an inclusive and highly attractive narrative;

- Effectiveness, achievements, scaling up, and replication as a result of monitoring and evaluation.

We can identify links to a series of guideline categories in these learning points, which make up a possible pathway to successful citizen engagement and the co-creation of NBS. The existing designs and implementations in the URBiNAT frontrunner and follower cities offer interesting and different participatory cases. As an example, four of these are analysed in relation to the guideline categories:

(i) In the pre-established community garden of Gadehavegård, in Høje-Taastrup (Denmark), a workshop was conducted as part of the URBiNAT local kick-off event, in which huge planter boxes with flowers and berry bushes were co-created in order to provide an instant reward to co-creators and inhabitants of the neighbourhood (Figure 2). This NBS example is even more appealing to citizens and stakeholders, as the harvesting of flowers, berries, and herbs at a greater scale will be made possible in the near future. The chosen place and the setting that framed the engagement of the neighbourhood's inhabitants (Where) around the existing meaningful endeavour of the community garden (Why), as a purpose for a participatory activity that integrates collective and individual gardening knowledge (Integration of participatory process results), constituted the key ingredients for successful citizen engagement in the NBS co-creation.



Figure 2. Planting box workshop during the URBiNAT kick-off event in the pre-established community garden of a Gadehavegård neighbourhood in Høje-Taastrup (Denmark), on 14 June 2020. Harvesting flowers, berries, and herbs at a greater scale will be made possible in the near future. Picture by Knud Erik Hilding-Hamann.

(ii) In Porto (Portugal), a task force made up of key stakeholders was formed to coordinate and provide project governance for many experiments now being designed in the designated social neighbourhood of Campanhã (Figure 3). The local task force initially brought together municipal technicians, experts, and researchers, and has been opening up to the involvement of citizens and other stakeholders throughout the engagement and co-creation process. For deprived neighbourhoods, NBS diagnostics, design (experiments), and implementation processes rely on and feed into Trust, co-Ownership, Governance, and

Regulation between the members of a community of stakeholders, identified as "participants", as do the experiments themselves. Several other factors also play a role, depending on the characteristics of the neighbourhood and the NBS.



Figure 3. Workshop organized by the URBiNAT local task force, on 14 July 2020, to share results and design actions of co-created ideas for the healthy corridor of Campanhã in Porto (Portugal). The local task force initially brought together municipal technicians, experts, and researchers, opening up to citizens and stakeholders throughout the engagement process. Picture by Nathalie Nunes.

(iii) In Nantes (France), the co-creation of a green loop as part of the URBiNAT healthy corridor is bringing the goals of municipal technicians more in line with those of the inhabitants of the Nantes Nord neighbourhood (Mediation). The different participatory activities promoted by the municipality and the local scientific partner (Intensity and levels of participation) made use of a communication campaign (Communication and interaction), raising interest among the inhabitants with the use of a subjective map, inviting them to use the green loop on their own (Ownership), and mobilizing them for a walkthrough and a co-selection workshop (Figure 4). Two walks were also organized by the municipality around the topic of food, together with a group of hikers involved in a working group on healthy food led by the communal centre for social action and the municipal public health division (Behavioural change). Facilities and activities are emerging through social innovation along a green path that connects the deprived neighbourhood with the rest of the city (Co-production). Pre-existing citizen initiatives plug into the work and help make it a reality (Culture of participation).

(iv) In Sofia (Bulgaria), a nonprofit organisation has successfully implemented a solution that was included in the URBiNAT NBS catalogue as a Social and Solidarity Economy NBS: the Bread Houses (Figure 5) [59]. The Bread Houses Network is an initiative of the International Council for Cultural Centers Association, which creates and unites centres for community-building, creativity, and social entrepreneurship [60]. The mission of the Bread Houses Network is to inspire individuals and communities to develop their creative potential and cooperate across all ages, professions, genders, special needs, and

ethnic backgrounds (Cultural mapping) through collective bread-making, accompanying art forms and education in ecological sustainability (Co-production) [60]. The Bread Houses Network is supported by other actors and stakeholders (Private sector) to co-deliver the benefits of participation (Governance) to citizens in the district of Nadezhda (Communication and interaction).



Figure 4. Communication material to invite reflection and action among inhabitants about a green loop in Nantes Nord. A workshop was organized on 14 October 2020 with local inhabitants and associations to discuss plans and hopes for the URBiNAT healthy corridor in Nantes (France). Picture by Tom Mackenzie.

This brief analysis of the emerging learning points reinforces the relevance of sharing and learning from different contexts on the basis of the ‘living’ guidelines for citizen engagement and NBS co-creation. It is particularly relevant in relation to the challenges, lessons learned, and best practices, which may inspire further developments of the categories and corresponding guidelines. These aspects constitute starting points for the inclusion of newly developed categories of guidelines or the enhancement of these aspects in the existing categories.

URBiNAT has been particularly involved in sharing and learning with H2020 NBS sister projects (e.g., the online workshop organized at the Nantes Innovation Forum in October 2020 [61,62]) and other EU-funded NBS projects within the framework of clustering activities [30]. These exchanges around the plurality of co-creation models and strategies adopted by EU-funded NBS projects echo the approaches of the emerging learning points.

As an illustration of an approach following a collective and participatory pathway to knowledge production, Figure 6 presents the methodology proposed and applied in the online workshop organized together with URBiNAT’s sister projects on “Co-creating solutions with local citizens and stakeholders within European projects”. This co-organized workshop was aimed at promoting co-creation for inclusive urban regeneration by showcasing the plurality of the models and strategies of the NBS sister projects, as well as with the purpose of fostering advances among projects by addressing their challenges, lessons learned, and best practices. The methodology of such exchanges promotes sharing, learning, and interaction around the examples, issues, and solutions from different projects. These are at the core of living knowledge, which results in prioritizing and analysing critical

issues, key findings, and recommendations. These are also at the core of the development of URBiNAT's 'living' guidelines for citizen engagement and NBS co-creation.



Figure 5. The URBiNAT project participated in a workshop at the Bread Houses Network in Sofia (Bulgaria), on 26 January 2019, during a meeting of its partners. Bread-making fosters cooperation and collective experience across cultures, professions, and ages. Picture by Rune Strunge.

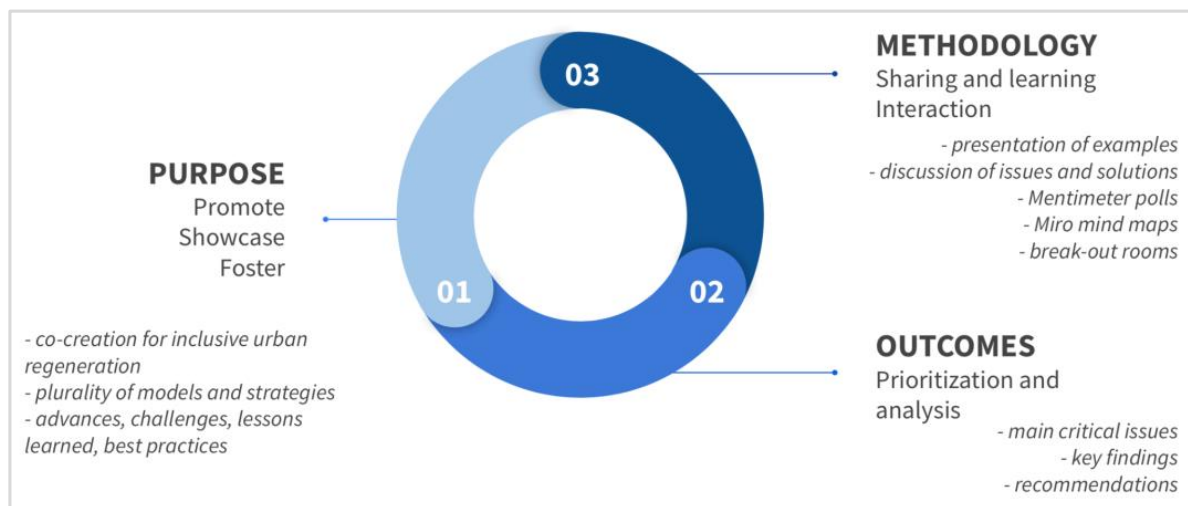


Figure 6. Methodology proposed and applied in the online workshop organized at the Nantes Innovation Forum on 8 October 2020, "Co-creating solutions with local citizens and stakeholders within European projects", together with URBiNAT's sister projects, CLEVER Cities, EdiCitNet, and proGReg. Source: Presentation and results of the workshop [61].

The research, testing, and validation of the URBiNAT guidelines will continue to be overseen by a task force dedicated to co-creation and governance, together with experts and representatives from European projects working on improving and promoting citizen engagement for the co-creation of NBS. The task force works in five workstreams covering: (i) Why co-create and what may stand in the way; (ii) Who to involve in the process;

(iii) How to integrate co-creation into policies and the co-governance of NBS; (iv) How to co-create NBS, showing different pathways for the co-creation of NBS; and (v) Monitoring and the evaluation of the co-creation of NBS.

The guidelines developed within URBiNAT as one of the European projects will be discussed during workstream meetings and worked on further, which will enable the advancement of a 'living' framework of guidelines for co-creation and citizen engagement. Such a 'living' framework can take the form of a wiki-project, as an open knowledge-building process, as well as promoting the concept of NBS co-creation to the wider audience of stakeholders engaging in NBS development.

We have seen that learning points concerning NBS co-creation can emerge from co-creation in the field of NBS project intervention areas, as well as inside and outside such projects, by means of interdisciplinary and intercultural sharing and learning. This diversity paves the way for an ecology of knowledges, based on the diversity of cultures and knowledges and the recognition of difference, as put forward by Boaventura de Sousa Santos [63].

4. Discussion

The guidelines, categories, and learning points that emerge from a diversity of participatory cases can evidence pathways to successful citizen engagement and the co-creation of NBS, thereby contributing to an evidence-based framework that also includes the prioritization and analysis of critical issues. Although great efforts have been made as part of the URBiNAT project to make room for citizen participation in the NBS co-design process, URBiNAT is, however, still challenged by the efficacy of its co-creation process, as much as other EU-funded projects dedicated to NBS, particularly in relation to participation and inclusion [64]. At the same time, these challenges constitute research opportunities to be further explored. To this end, we have organized three main directions for discussion: an interdisciplinary and intercultural approach to the development of NBS; rethinking engagement, especially in times of COVID-19; and sharpening participation for inclusive and innovative urban regeneration with NBS.

4.1. Working Interdisciplinary and Interculturally in Developing NBS

The European Commission report on the state of EU-funded NBS projects raises a range of critical issues in relation to participatory methods, such as those mentioned in the introduction to this paper [10]. Moreover, the analysis stresses that fundamental questions of politics, arising with the involvement of highly diverse urban communities in the development of NBS, are often neglected. When efforts are made to increase participation and inclusion in the co-design and implementation of NBS, emphasis is often on minimising conflict and reaching consensus [10,65,66]. Consequently, the limitations of the co-design and co-production processes must be taken into consideration when it comes to fostering new processes for participation and inclusion [10].

These do not only provide a warning of the critical issues, but also of important considerations highlighting the needs for future research and innovation in the field of NBS. If sufficient technical knowledge on the design of specific NBS types already exists, there is still a need to develop the understanding of the economic, social, political, and cultural dimensions of designing and implementing NBS, moving beyond seeing the implementation challenge as primarily a 'technical' issue [67,68]. This includes revealing the structural aspects or aspects that have been revealed in the development of NBS, such as conflicts that arise but that are not taken on board and dealt with when a purely technical approach to participation is used [10,65,66], as well as power imbalances relative to marginalised voices [28], and power manifestations in multistakeholder collaborations, including academic disciplines, experts, and social circles in civil society [69].

In the case of URBiNAT, revealing and addressing the dimensions of the design and implementation of NBS was introduced relative to the ethics requirements and the rights-based approach, for example, in line with a cross-cutting approach, in order to

make these issues integral dimensions of the project [33,39]. This also consists of mapping and analysing local participatory cultures in order to pave the way for testing a strategy for a municipal roadmap for the healthy corridor, adjusted to the local needs, cultures, and ambitions of each city [34,35]. The strategy of the municipal roadmap addresses the commitment of advancing innovation in the decision-making process of each city and is aimed at improving the quality of participation as both a means and an end [34,35].

The participatory cultures that URBiNAT builds on in each of the seven city districts are characterised by a population of citizens, the vast majority of whom have a good grasp of all the things that need to be improved in their neighbourhood. However, as the literature shows, when the majority of citizens do not see hope, do not trust the authorities, and have social and or health issues, engaging them in co-creation for the benefit of all requires an extraordinary level of mobilisation in order to bring about an individual and community readiness to engage in, and lead, change in the community [70]. As highlighted by practitioners from the field in URBiNAT cities, when reviewing the URBiNAT guideline categories, some significant factors, such as Trust and Transparency, may impact citizen engagement to a greater extent depending on the local context. This is particularly the case of contexts marked by distrust or a history of failure and disappointment, which require that different mechanisms be explored [71].

Therefore, building a 'living' framework that addresses the core leverages for successful citizen engagement in the co-creation of NBS requires further exploration of the interdisciplinary and intercultural work involved. In the case of the guideline category, Trust, it is the guideline itself that needs to be analysed, both as a means to enabling citizen engagement (building trust and motivating despondent citizens), and as an end, resulting in empowered participation in accordance with the local context. This involves differentiating how groups of citizens, including administrators, organisational stakeholders, and 'leaders' are motivated and engaged, what role they can play, the level of resources they can commit to a co-creation process, and what it will take to achieve sustained participation.

Researchers can also contribute with reflexivity to bring blind spots to the surface in the framework of action research on the basis of, for example, the conceptual framework of the sociology of absences and the sociology of emergences developed by Santos [72]. On the one hand, the sociology of absences contributes to identifying what has been made invisible, devalued, or rendered nonexistent; on the other hand, the sociology of emergences contributes to valuing the resistance of social groups and identifies in this resistance principles and practices of governance that point to other experiences [73]. The ecology of knowledges and intercultural translation intervene as tools for the diversity of knowledges made visible by the sociology of absences and the sociology of emergences, thereby reinforcing a research agenda that promotes interdisciplinary and intercultural approaches in the development of NBS. These are, indeed, key to further developing the guidelines for citizen engagement and NBS co-creation as living knowledge.

4.2. Rethinking Engagement, Especially in Times of COVID-19

The impact of COVID-19 on public space and urban planning and design is a pressing subject of research, particularly for addressing how the needs of vulnerable groups (e.g., racial minorities, immigrants, women, older adults, children, people with functional diversity, and the homeless) will be accounted for in the future designs, practices, and rules for public spaces [74]. In this respect, the measurement of changes in use and the perceptions of public spaces will be critical, especially with regard to the possibilities they offer for socialization, recreation, claim-making, community building, and identity formation [74].

Meanwhile, cities are coping with limitations on interaction because of the pandemic, which affects both in-person and virtual interactions. Specific vulnerabilities have to be taken into account in the case of social neighbourhoods and deprived areas, and these are becoming more evident than in the past because of the COVID-19 pandemic [75,76]. These specific vulnerabilities are the pre-existing unequal conditions of structurally vulnerable

neighbourhoods, where morbidity and mortality may be hardest felt, as a consequence, for example, of racial/ethnic health inequities [77]. If significant factors impacting citizen engagement remain key, some of the issues at stake have become more critical in the aftermath of the pandemic, in particular and most importantly, how people feel about their current situation and their perspectives on the future, and, subsequently, how people want to engage now, by what means, and through which channels, as well as how to rethink the methods and tools.

In this context, URBiNAT cities gathered information and came up with a picture of some of the aspects related to the repercussions, challenges, responses, and alternatives that emerged from the pandemic [75]. URBiNAT cities are committed to sharing with and learning from each other, and this effort has produced different but complementary pictures, analyses, and perspectives for the tackling of increased and new social challenges, which may possibly lead to common strategies embedded in solidarity.

This consultation process, in which the cities involved shared the impact of COVID-19 with URBiNAT, confirmed that the crisis primarily highlights and amplifies existing inequalities and increases the vulnerability of large sections of the populations of social neighbourhoods, such as in the case of Brussels (Belgium) [78], Nantes (France) [79], and Porto (Portugal) [80]. These increased and new challenges faced by the populations in the URBiNAT intervention areas include economic shortages in some households, food emergencies, the digital divide, psychological distress, and psychic suffering, to name some of the points.

Building on lessons learned is about rethinking many aspects of life in the city. This is a time and opportunity for cities to rethink the use and development of housing, transport, and public spaces, particularly in relation to citizens in the most vulnerable conditions [81], as highlighted by representatives from the URBiNAT cities of Sofia (Bulgaria), Høje-Taastrup (Denmark), Siena (Italy), and Nova Gorica (Slovenia). It involves, for example, working to preserve physical and mental health [82], developing a resilience to dealing with uncertainty, and similar challenges in the future, which will differ across different groups [83]. The renaturing of cities and the provision of healthy spaces for leisure [84] must also be prioritized.

Most importantly, building an 'alternative future' begins, crucially, with the communities that control the management, care, and regeneration of green areas and other common spaces. These could be delegated to citizens by creating collaboration agreements between them and the administrative bodies [85]. Participatory spaces are, therefore, important tools for asking people about their current situation and their perspectives on the future, for sharing experiences of pain and suffering in a social setting, and for shifting from the sphere of individual experience to that of collective processing [86]. This is increasingly important to the understanding of the economic, social, political, and cultural dimensions of designing and implementing NBS, both during and after the pandemic.

The limitations on interactions with citizens and stakeholders because of the current COVID-19 crisis also require us to rethink participation by developing sustainable models for keeping citizens engaged. The guidelines for citizen engagement and the co-creation of NBS, based on a 'living framework', need to include questions on the 'after', how much the participatory processes of the 'new normal' will have to change, and how to rethink the participatory devices for involving inhabitants in public policies [87]. More broadly, beyond methodologies and outreach, it also raises the need to rethink formal citizenship and to adopt affirmative interventions as a way of reducing democratic gaps and disseminating new forms of participation. Particular attention must be paid to supporting the most vulnerable groups and territories [87], as these were especially susceptible to the increased and new challenges.

4.3. Sharpening Participation for an Inclusive and Innovative Urban Regeneration with NBS

The publication on the state of the EU-funded NBS projects points to the need for NBS initiatives to be designed and implemented with the explicit intention of addressing

the inequalities and tensions underlying urban development, so that they can potentially contribute to the realization of sustainable communities [10]. In the case of URBiNAT, the challenges and responses devised in the field of the social and solidarity economy, as a pillar of its approach to urban regeneration and inserted in the NBS framework, address several related aspects: the problematization of the multidimensional and intersectional causes of inequalities in the urban space; the realization of the social well-being of vulnerable individuals and groups through opportunities for strengthening social relations, autonomy, and economic conditions; new models of governance aimed at community development by influencing public policies and through the empowerment of people for social change [34,45].

Another aim of the project is equality and equity for all, the latter being related to the intersectional approach, which is based on the notion that specific modalities of subordination and discrimination act in an integrated manner, as experienced by racialized and minoritized peoples and communities [33]. In this respect, the application of ethical requirements and a rights-based approach combine a series of principles that are complex and challenging to implement in both theory and practice [54].

Firstly, to make these themes integral dimensions of URBiNAT involves always having them present in the planning and development of activities. It also involves as many partners of the consortium as possible adopting these lenses in their internal and organizational agendas, and in their analyses and perspectives on the project's progress and results. However, it may also require changes in the established procedures and cultures of partners and stakeholders and their values and practices inside the deep core of hierarchies and organizational cultures and practices [39], especially in relation to gender mainstreaming and intersectionality [88]. Putting into effect a rights-based framework requires an awareness of, and an ability to manage, controversies, including complaints, and must also take into consideration that the behaviour of project researchers, technicians, and experts in the field, such as being accessible, responsive, and transparent, is at the heart of these interactions [39,89,90].

Furthermore, reaching and engaging marginalized voices requires not only strategies and methods for the inclusion of their visions and perceptions in the development of NBS, but also the investment of time, energy, and resources to enable consistent improvement in the quality of participation as both a means and an end. It is about inclusiveness beyond the term of the project and looking at the deep-seated inequalities that are present when inclusive and innovative urban regeneration projects handle a complex combination of societal challenges that aim to contribute to the right to the city. This again has to do with developing an understanding of the economic, social, political, and cultural dimensions of designing and implementing NBS, and moving beyond seeing the implementation challenge as primarily an immediate 'technical' issue [67,68].

5. Conclusions

This paper systematizes the efforts and results involved in the development of guidelines for citizen engagement in the first three years of the URBiNAT project, which have also contributed to establishing the URBiNAT Community of Practice [36]. This includes sharing and building on differences and highlighting core leverages for successful participation, as well as sharing visions about the results of community-driven processes. This approach is at the core of co-creation and encourages researchers and practitioners to build a mixed knowledge base with key stakeholders [91]. It also takes into consideration local participatory cultures and the specificities of segments of individuals and citizens [92], hence stimulating the scaling up of local sustainable citizen-driven initiatives.

Further research is needed to deepen the categorization of guidelines for citizen engagement and to understand the timings and contexts for their application. This would also contribute to improving NBS as an approach, another area in which research is required [2,93]. Participation is considered to be both a means and an end to the shaping of

the urban environment and promoting active citizenship and social cohesion by the means of strategies that are collectively designed.

The need to improve NBS as an approach has emerged, enabling them to become more comprehensive and holistic. This is particularly true in terms of social embedding and the impacts that need to be considered so that NBS can become more than just tools, technologies, and instruments [93]. Research on community-based and policy-based initiatives aimed at improving sustainability and liveability, and that fosters inclusivity and social justice, has also evidenced the transformative social impact of NBS; new social relationships and configurations are mediated, contributing to social innovation in cities and changing perceptions of nature and human–nature relationships in urban contexts [2]. URBiNAT, in turn, aims to enrich and complement the NBS concept with new perspectives, such as the ones introduced with Participatory NBS and Social and Solidarity NBS, and more ingredients, such as the ones that compose its ‘living’ framework of guidelines for successful citizen engagement in the co-creation of NBS.

The COVID-19 pandemic has reinforced the relevance of a systemic approach with mixed methods and multichannel systems of engagement [94], which can be important in challenging traditional NBS by confronting them with new visions. This is not only about targeting specific segments of the population, but also about building upon complementary participatory processes that provide both immediate results and medium- and long-term visions, towards complexifying the visions of all the intervening actors and going beyond immediatism and self-referentiality [95]. For instance, the practice of participatory budgets, which tends to encompass immediate investments and short-term perspectives [95], has been transforming and improving with other instruments of planning and visioning [96]. This then permits a dialogue that contains strategic visions brought about through long-term visioning exercises, a process in which a community envisions the future it wants and makes plans for how to achieve it [97]. In rethinking many aspects of life in the city, citizen engagement and the co-creation of NBS may contribute to a paradigm shift in society’s relationship with nature, in line with the promotion of multisectoral and multidimensional approaches towards healthier cities [98–100]. In the context of a ‘living’ framework, citizen engagement constitutes a critical aspect of the development of NBS so that NBS reach their full potential, as well as the advancement of the science and practice of NBS not only as a scientific rethinking [101,102], but also as part of an ecology of knowledges where participation is seen as both a means and an end.

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that allows project members to comment and reflect on the issues. It is available upon request to the corresponding author [58].

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Appendix A

Table A1. URBiNAT-detailed initial framework on guideline categories addressing core leverages for successful citizen engagement in the co-creation of nature-based solutions (NBS).

Category of Guidelines ¹	Prioritization ²	Strategic Overview	Operational Details	Impact of Other Categories
Communication and interaction	1	Communicating specificities for interacting with citizens.	Covers, in operational terms: (1) Communication strategies; (2) Communication materials and channels; (3) Multichannel interaction; (4) Codes of conduct related to communication and ethics.	This category ties in with the category of Trust, especially with regard to how communication and interaction with residents happens. For instance, depending on the city, building trust may be based on meetings and face-to-face encounters, whereas the use of digital tools is limited and aimed at incentivising being together. Social circles of residents may also be limited to close relatives, which enhances the importance of providing a space where people can communicate and not be frightened of being together. Furthermore, organisations working with specificities constitute important partners in establishing communication and interaction with particular groups and individuals.
Behavioural changes	2	Instigating behavioural adjustments, or changes in behaviour, in some particular respect.	Namely, by: (1) Challenging traditional models of governance, expert advice, and implementation; and (2) Instigating adjustments to attitudes, mindsets, and behaviours in support of participation and collaboration.	Ties in with the category of Communication and interaction in many ways, including: how residents are shown that their inputs are valuable and can be applied for the creation of change; identifying and engaging agents of change; promoting participatory and creative activities to address specific behaviours (e.g., aggression, intolerance, lack of openness, and looking at the different cultures and existing boundaries built on the differences).
Trust	3	Improving or creating relationships of trust between citizens, and between citizens and city staff, politicians, and other agents.	With particular attention to: (1) Confidence and team dynamics; and (2) Language.	Ties in with the categories of Transparency, Inclusion, Communication and interaction, and Governance by: ensuring that everyone is part of the conversation and deliberations; documenting the activities to promote ownership; qualifying local ideas instead of bringing many ideas from practitioners/experts; properly communicating and translating what the residents feel, as well as repeating people's opinions. It also ties in with the categories of Culture of participation and Cultural mapping since, as highlighted by practitioners from the field in URBiNAT cities, Trust and Transparency may impact citizen engagement to a greater extent according to the local context. This is the case of contexts marked by distrust or a history of failure and disappointment, which require the exploration of different mechanisms [71].

Table A1. Cont.

Category of Guidelines ¹	Prioritization ²	Strategic Overview	Operational Details	Impact of Other Categories
Co-production	4	Stimulating and improving the co-production of public services, participatory processes, and product development.	Focusing in particular on: (1) The process by which citizens participate in the implementation and delivery phase; (2) An open process of participation that includes a wide range of key actors, namely, end-users.	Ties in with the categories of Trust and Behavioural change, in particular relative to team dynamics at the different stages of the NBS co-creation process, and by challenging traditional models of implementation.
Inclusion	5	Having specific guidelines to guarantee the inclusion of diversity.	Concerning: (1) The different modalities of the participatory process; (2) Not only pursuing the 'usual suspects' who always participate and are more engaged because of their availability, resources, and professional/disciplinary skills, and may also constitute an exclusive group; (3) Capacity and tools to address and welcome diversity.	Ties in with the categories of Citizenship rights, Governance, Transparency, and Regulation, given that inclusion must be shown through bonds and by sticking together (e.g., the scene is the house for volunteer associations where they can bring more people). It also ties in with the category of Supportive methodologies and techniques in terms of the modalities for mobilization and inclusivity in the participatory process.
Regulation	5	Clarifying rules and regulations for equal rights in the expression of visions and priorities.	It means not only to: (1) Establish rules and regulations for the participatory process; but also (2) Promote co-decisional processes.	Tying in with the categories of Governance, Transparency, and Trust, the local contexts may bring additional critical issues, such as when rules are not followed.
Governance	6	Balancing interactions among citizens, city staff, politicians, and other agents.	The Governance category focuses on: (1) Opening doors in the public sphere and balancing power relations; (2) More liveable and balanced interactions; (3) Organization of participation in an integrated manner, going beyond the institutional division of municipal departments.	It ties in with the categories of Trust, Transparency, and Culture of participation. The use of Participatory NBS is particularly relevant in this respect, by promoting participatory activities that improve collaboration and empower individuals in the decision-making process.
Innovation cycle	7	Adopting processes of rupture and searching for alternative solutions to address concrete social problems.	By: (1) Breaking the crystallized image of a problematic neighbourhood, including observing a code of conduct for the communication and dissemination of activities; (2) Connecting people, introducing creativity, and mobilizing energy.	The use of Participatory NBS is relevant in promoting such an innovation cycle when they focus on the available resources, assets, and relationships of solidarity in the community. Ties in with the category of Citizenship rights relative to strengthening the capabilities and empowerment of the population as well as the satisfaction of needs and the corresponding access to rights.

Table A1. Cont.

Category of Guidelines ¹	Prioritization ²	Strategic Overview	Operational Details	Impact of Other Categories
Transparency	8	Arguments for encouraging efforts to act in a transparent manner.	With an emphasis on: (1) Reflecting on why people should participate in the process, and being clear about purposes and rules; (2) Avoiding hidden agendas or information.	Ties in, to a great extent, with the categories of Trust and Governance. When there is a lack of trust between citizens and politicians, transparency is even more necessary from the municipality as a governance issue to build trust. It also ties in with the categories Why participation and Monitoring and evaluation, given the need to provide information enable discussion of the results of each stage, and to include a systematic follow-up. This means being able to speak about expected results that are both positive and negative, and to give feedback about what is going well and what is not, which will impact expectations and trust.
Intensity and levels of participation	8	Setting different approaches and levels of participation depending on the goals and real conditions for participation.	Through: (1) Systematic awareness of the conditions under which citizens are prepared to engage in actions of social innovation; and (2) Thinking about different steps to citizen engagement (e.g., communication, information, consultation, participation, co-building).	Ties in with the Culture of participation category, which can reveal strengths, weaknesses, and gaps in interaction and will guide the design of participatory processes. To be community-driven, the design must focus on raising the intensity of interactions among citizens, stakeholders, organizations, and institutions.
Citizenship rights	9	Broadening the meaning of the appropriation of social, urban, political, and cultural rights, both internally in the collective imagination, and externally in rejuvenated relationships with local powers.	In operational terms, the emphasis would be on addressing: (1) Access to and implementation of rights; (2) Engaging/empowering; (3) Strategies designed to promote participation according to specificities; (4) Codes of conduct related to research and ethics.	Ties in with the category of Inclusion, namely, concerning the modalities of the participatory process which addresses, welcomes, and promotes diversity. The use of Participatory NBS, such as Forum Theatre, is relevant in this respect in that it involves the community in the analysis and discussion of problems, thereby raising awareness and encouraging citizen participation.
Cultural mapping	10	Articulating and making visible the multilayered cultural assets, aspects and meanings of a place.	It: (1) Encourages the attachment of citizens to a location; and (2) Acts as a catalyst to the process.	Tying in with the category of Inclusion and more than simply just another tool, cultural mapping is relevant if used as an approach to get to know people, address their specificities, what they like to do, and what they want to do, as used in the co-diagnostic phase of the URBiNAT co-creation process. It also ties in with the categories of Innovation cycle and Supportive methodologies and techniques as a Participatory NBS, since cultural mapping emphasizes processes that enable projects to be platforms for discussion, engagement, and empowerment.

Table A1. Cont.

Category of Guidelines ¹	Prioritization ²	Strategic Overview	Operational Details	Impact of Other Categories
Facilitation	-	Having specific guidelines to address facilitation that include other participatory guidelines.	Defining: (1) The main attributes of facilitation in understanding the role that is expected; (2) The different steps of the co-creation process, including information about NBS; (3) How to hold successful public meetings based, for example, on successful participatory cases; (4) The principles and requirements of ethics.	These aspects need to be covered in guidelines, training of local facilitators, and corresponding support materials. Participatory NBS, such as Learning for Life or community workshops, constitute useful resources to help organize these aspects and put them into practice, by providing protocols and approaches that will support facilitation. This category, therefore, ties in with the category of Supportive methodologies and techniques.
Quality of deliberation	-	Setting a meaningful deliberation process.	Through: (1) Authentic deliberation; (2) A clear decision-making process; and (3) Ensuring equal rights of expression.	More than simply voting, the focus is on interaction, democratic decisions, and expression, which ties this category in with the categories of Regulation, Governance, Citizenship rights, and Facilitation.
Where	-	Having guidelines for the spaces in which the participatory events are held.	Addressing: (1) Place/setting: as well as (2) Form and quality.	Ties in with the categories of Communication and interaction and Facilitation since the definition of these aspects is all the more relevant when dealing with a lack of space in which to speak and do things together. Spaces to not only share visions, values, roles, dialogue with people, but also to create a dialogue between people. For example, older adults and victims of violence need to be heard in a space where they can voice what they want to do and what they need. Determination of how to devise a model for a space that incentivises people to work constructively together is key.
When	-	Identifying the best moment for the participatory events.	Including: (1) Time/day; (2) Date; and (3) Phase.	In practical terms, this category implies meeting the community and knowing as much as possible about the needs of the people who live in the area of intervention, as well as their habits and traditions, so that the participatory activities can be tailored to fit. Additionally, to be relevant, participation cannot happen at the end of the process of planning a project. Ideally, we should all begin together, with an empty page or question to be addressed, but it depends on the project, on whether it has already started, and on its technical level. What needs to be assessed is the decision on the right time/phase to engage. Therefore, this ties in with the categories of Communication and interaction and Facilitation.

Table A1. Cont.

Category of Guidelines ¹	Prioritization ²	Strategic Overview	Operational Details	Impact of Other Categories
Supportive methodologies and techniques	-	Using specific methodologies and guidelines to support mobilization and inclusivity.	Considering: (1) Culture as a platform; (2) Lower degrees of formalization; and (3) Articulation of knowledge.	Ties in particularly with the categories of Communication and interaction, Facilitation, and Cultural mapping. Generally speaking, in practical terms, arts and community events can facilitate creativity. We can also consider here the appropriation of complex languages by including people's knowledge in dialogue with technical and scientific knowledge. Going beyond Cultural Mapping, Forum Theatre, or community-based art, which makes specific use of the arts, Participatory NBS comprise protocols, approaches, and methods aimed at engaging citizens at different stages of the co-creation process.
Integration of the results of participatory processes	-	Enlarging the scope of co-creation to validate the ideas developed.	Through: (1) Cross-pollination; (2) Validation; (3) Systematization; and (4) Definition of purpose.	This ties in particularly well with the categories of Communication and interaction, Facilitation, and Supportive methodologies and techniques, concerning the use of communication materials and channels, the definition of the different steps of the co-creation process, and with the articulation of knowledge from people, technicians, experts, and researchers.
Private sector	-	Mapping the relevant private sector actors with interests in, and input to, the NBS targeted area.	Requires: (1) Mapping who has links and can facilitate contacts with private actors (e.g., business associations, local companies, private owners), as well as their eventual roles in the co-creation of NBS; (2) Conducting meetings and workshops with specific groups to understand visions, priorities, and interests, as well as bringing all participating groups together to devise a common vision and project, as well as to seek formal commitment.	Highlighted here is the definition of the relevance of the private sector, not limited to actors, among others. It ties in with the categories of Co-production and Innovation cycle relative to the development of products and services, the involvement of a wide range of key actors, and connecting them based on creativity and the mobilization of energy.

Table A1. Cont.

Category of Guidelines ¹	Prioritization ²	Strategic Overview	Operational Details	Impact of Other Categories
Monitoring and evaluation	-	Addresses monitoring and evaluation of the participatory process.	The aspects related to monitoring and evaluation of the participatory process cover: (1) The process itself; (2) Results and impact of participation; (3) The different aspects of evaluation guiding the selection of methods for impact assessment, taking into consideration: (4) Participatory monitoring and evaluation; as well as (5) Participatory impact assessment.	Ties in with the categories of Transparency in terms of information and follow-up, and Ownership of the co-creation process and the corresponding results.
Risk assessment and mitigation measures	-	Identifying the factors influencing co-creation processes, as well as those leading to the failure of co-creation and co-production.	In operational terms, it covers the identification of both: (1) Basic requirements in the risk assessment of co-creation processes; (2) Mitigation measures corresponding to risk factors related to the process of engaging citizens in co-creation and their participation in the implementation and delivery phase.	It ties in with the categories of Monitoring and evaluation and Transparency regarding clarity of the participatory process, its assessment, and improvement.
Ownership	-	Citizens having ownership of both problems and solutions.	This depends on: (1) The assumption that practitioners can only bring knowledge if people own the process, by providing the framework but not taking the lead; (2) Enabling inputs from people by showing that contribution is possible and providing safe spaces, as well as implementing a diversity of appealing activities.	This category, therefore, ties in with the categories of Trust and Communication and interaction.
Culture of participation	-	Enabling regular interaction with citizens, and increasing the culture of participation.	Requirements: (1) Transversally increasing the culture of participation in all departments of the municipality by introducing new models that involve all people and services, as well as building bridges between the public sector, the private sector, and citizens; (2) Enabling initiatives by citizens, with consideration given as to how to encourage, receive, and adapt to spontaneous initiatives that they make, and how to listen to and receive these initiatives, some of which will be off the municipal radar.	Ties in with the categories of Governance and Intensity and levels of participation, regarding interactions between city staff and citizens.

Table A1. Cont.

Category of Guidelines ¹	Prioritization ²	Strategic Overview	Operational Details	Impact of Other Categories
Why participation	-	Being clear as to why we need to engage citizens and support participatory processes.	Includes: (1) The object of participation, and the things we want to discuss and do with people; (2) The purpose of participation, why participation is important to the project in question, and what motivates people to participate; (3) Ways of carrying out participation, and why we use specific methodologies; (4) The relevance of participation, since not everything needs to be in the form of dialogue/discussion. Participation is not always the solution, and sometimes inputs can be received in other ways.	Ties in with the categories of Transparency and Intensity and levels of participation relative to the clarity of purpose and rules, as well as to the consideration of different approaches in accordance with the goals and real conditions of participation.
Mediation	-	Dialogue and collaboration.	Covering both: (1) The resolution of conflicts; and (2) The use of dialogue to foster collaboration between people who do not have much experience in this type of problem solving.	Ties in with the categories of Communication and interaction, Trust and Facilitation, concerning strategies that are sensitive to local history and existing relationships, to build trust and foster being/working together, as well as the specific attributes and expected role of the mediator.

¹ Categories that emerged from both the systematization and two-stage review process of URBiNAT guidelines for citizen engagement, and the sharing and learning with practitioners from the field in URBiNAT cities: categories that emerged from Step 1 of systematization (extract and organize) are in light grey; those from Step 2 (review and aggregate) are in medium grey; additional categories that resulted from sharing and learning are in dark grey. ² Prioritization of guideline categories by members of the global Living Lab community in which the 10 most critical aspects of citizen engagement are ranked. This was the result of an external workshop conducted by the URBiNAT working group on participation during the Open Living Lab Days in September 2019, organized by the European Network of Open Living Labs (ENoLL) in Thessaloniki (Greece).

Appendix B

Table A2. Preliminary learning points emerging from citizen engagement in the co-creation of nature-based solutions (NBS).

Learning Points	Overview and Discussion	Examples of NBS Participatory Cases	Links of Learning Points/Categories
The appeal of NBS to citizens and stakeholders aesthetically, socially, economically, and charitably.	NBS need to be aesthetically, socially, economically, and charitably appealing to citizens and stakeholders so that they are encouraged to engage with, further develop, maintain, and protect them.	A workshop was conducted at Høje-Taastrup (Denmark) in which huge planter boxes with flowers and berry bushes were co-created to provide an instant reward to co-creators and the inhabitants of the neighbourhood.	Why participation, Where and Integration of participatory process results.
NBS and new urban spaces where people with common interests can regularly gather and engage.	NBS create new urban collective spaces at the neighbourhood level and across the city. This is achieved both virtually, through online platforms, and physically, by creating attractive physical spaces where people with common interests can gather and engage on a regular basis, as part of their daily lives or for special events.	In Milan (Italy), a previously deprived neighbourhood was turned into an attractive neighbourhood through the online coordination of many different events and facilities, including local radio, breakfast meetings on street corners, and support for the opening of small shops and services.	Where, Innovation cycle, and Ownership.
Diagnostics, design, and implementation of NBS rely on a community of stakeholders.	For deprived neighbourhoods, NBS diagnostics, design (experiments), and implementation processes rely on and feed into trust, co-ownership, governance, and regulation between the five main stakeholders, identified as "participants" in the URBiNAT model [33]: (1) The municipality (political representatives and technicians of different departments); (2) Housing administrators (responsible for the management of social housing); (3) NGOs, businesses and other private and public organisations working in the intervention areas; (4) Champions/ambassadors and facilitators; and (5) Citizens, as well as in the experiments themselves. Several other factors also play a role depending on the characteristics of the neighbourhood and the NBS.	In Porto (Portugal), a task force made up of these five actors has been formed to coordinate and provide project governance to many experiments now being designed in the designated social neighbourhood.	Many of the guideline categories and especially Trust, Ownership, Governance, and Regulation.
Strong common projects between actors with different organisational goals as propellers of social innovation.	Sustainable NBS emerge strongly from the fabric of social innovation at the neighbourhood and urban levels, building success on the back of strong common projects between actors with different organisational goals (link to a sense of co-ownership). Social innovation is referred to here as a process, implying changes in social relations and power relations, or as a product, by means of the construction of methodologies, artifacts, and/or services, especially those aimed at strengthening the capabilities of the population, the satisfaction of needs, and the access to rights [103–106].	In Nantes (France), facilities and activities are emerging through social innovation along a green path that connects the deprived neighbourhood with the rest of the city. Pre-existing citizen initiatives plug into the work and help make it a reality.	Communication and interaction, Ownership, Intensity and levels of participation, Culture of participation, Mediation, Behavioural change, and Co-production.

Table A2. Cont.

Learning Points	Overview and Discussion	Examples of NBS Participatory Cases	Links of Learning Points/Categories
Inclusive and multistakeholder governance as a result of a collaborative approach.	NBS require a collaborative approach that involves and engages all five stakeholders, developing governance that both influences and sets limits for all five, while ensuring that the strengths and weaknesses of each actor are integrated into the division of roles and responsibilities.	In Sofia (Bulgaria), the Bread Houses Network is supported by the other actors and stakeholders to co-deliver the benefits of participation to citizens in the district of Nadezhda.	Communication and interaction, Private sector, Co-production, Cultural mapping, and Governance.
Bridging differences through an inclusive and highly attractive narrative.	An inclusive and highly attractive narrative (vision and mission) for the implementation of NBS can help bridge differences between municipal departments, participating businesses, and organisations, and between the different housing blocks in neighbourhoods.	The vision for Helsingborg (Sweden) is that, by 2035, the city will be creative, pulsating, inclusive, and balanced for people and businesses. The city by then will be exciting, attractive, and sustainable. This common vision, which is defined in more detail locally, informs and governs all NBS and other regenerative activities in the city.	Inclusion, Trust, Governance, and Communication and interaction.
Effectiveness, achievements, scaling up, and replication as a result of monitoring and evaluation.	The design, monitoring, and evaluation of NBS need to be arranged so that the effectiveness and achievements can be measured and analysed, enabling successful NBS to be scaled up and repeated in other similarly deprived areas.	In the municipality of Høje-Taastrup (Denmark), the stakeholders are transferring documented models using URBiNAT co-creation methods from one deprived neighbourhood, Charlottetkvarteret, where the quality of life has improved, to another neighbourhood in the city, where there is the potential to achieve similar results.	Monitoring and evaluation, Private sector, Behavioural change, and Co-production.

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