proGIreg

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Guidelines for co-designing and co-implementing green infrastructure in urban regeneration processes

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Contents

Figures

Tables

Document revision history

Version	Date	Modification reason	Modified by

Partner organisations

No.	Name	Short name	Country
1	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN	RWTH	Germany
2	COMUNE DI TORINO	COTO	Italy
3	FONDAZIONE DELLA COMUNITA DI MIRAFIORI ONLUS	MIRAFIORI	Italy
4	PARCO SCIENTIFICO E TECNOLOG-ICO PER L'AMBIENTE - ENVIRONMENT PARK SPA	ENVIPARK	Italy
5	UNIVERSITA DEGLI STUDI DI TORINO	UNITO	Italy
6	POLITECNICO DI TORINO	POLITO	Italy
7	ASSOCIAZIONE ORTIALTI	OA	Italy
8	DUAL SRL	DUAL	Italy
9	STADT DORTMUND	DORTMUND	Germany
10	DIE URBANISTEN EV	URBA	Germany
11	HEI-TRO GMBH	HEITRO	Germany
12	LOHRBERG STADLANDSCHAFTSARCHITEKTUR PARTNERSCHAFT FREIER LANDSCHAFTSARCHITEKTEN MBH	LOHRBERG	Germany

13	FACHHOCHSCHULE SUDWESTFALEN	SWUAS	Germany
14	AQUAPONIK MANUFAKTUR GMBH	APM	Germany
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17	ZAVOD ZA PROSTORNO UREDENJE GRADA ZAGREBA	ZZPUGZ	Croatia
18	KOMFOR KLIMA GRUPA DOO ZA PROIZVODNJU TRGOVINU I USLUGE	KKG	Croatia
19	UDRUGA ZELENE I PLAVE SESVETE	ZIPS	Croatia

Abbreviations

FC: follower Cities

FRC: front-runner Cities

GI: Green Infrastructure

LL: Living Lab

NBS: nature-based Solutions

proGIreg: productive Green Infrastructure for post-industrial urban regeneration

Executive Summary

These practical guidelines offer general and transferrable guidance on how to initiate, steer and organize collaborative co-design processes for local NBS, together with multi-dimensional stakeholders in any given city. They target anyone aiming to lead, organise or facilitate participatory multi-stakeholder engagement processes for NBS, especially municipal representatives. Taking the local and varied co-design processes in the Living Labs (following LL) of the three European Front Runner Cities (following FRC) Zagreb, Dortmund and Turin during the H2020 project proGIreg as starting points, these guidelines capture, and package relevant experiences and lessons learnt.

LL represent areas where tailor-made social, economic and technological ideas and concepts and solutions are developed and tested in real-life settings with active citizens participation and empowerment as key ingredients. A thorough spatial analysis (Task 2.1) of the LL area and regeneration district performed by all FRC and Follower Cities (following FC) preceded the co-design process (Task 2.2). This helped to understand the context-specifics and challenges of each LL and the NBS for co-design activities and further NBS pilot implementation (WP3). For instance, SWOT analyses helped gain an understanding of how marginalised groups – as a specific focus of proGIreg - are constituted within the LL area or identify additional sites for NBS interventions within the regeneration area. This provided a valuable basis for the co-design activities, also to assess potential benefits for different stakeholder groups of the planned NBS. Moreover, the comprehensive stakeholder compilation for each NBS was revisited to identify potential gaps in the current set of stakeholders per NBS and developed further to map stakeholders according to the envisaged level and intensity of their engagement (i.e. consult, involve, partner, empower) per NBS.

ProGIreg pursues LLs in which citizens are involved as a source of co-creation to increase social acceptance, foster support and plant the seed for co-implementation and co-maintenance of the NBS.

A close collaboration was sought with the work package for co-implementation process (WP3) to ensure that co-design activities (WP2) are interlinked well before starting the NBS implementation. This was important for the co-design process with local stakeholders - as the first stage in co-creation processes - to be continued into co-implementation of NBS in each city.

The co-design guidelines will support the FC in developing urban regeneration plans (Task 2.3) by providing a roadmap for establishing stakeholder engagement with clear roles and responsibilities as well as suited organizational and management structures. Six easy-to-use co-design principles provide direction and are meant to guide co-design-oriented planning and decision-making processes in a LL context. They can be used flexibly and adjusted to different contexts. The manifold tools aim to assist tackling NBS co-design in a structured and informed manner, whereby the parameters identified to affect the co-design process (see p.10) point to potential hurdles that need consideration. The distilled experiences and lessons learnt from the co-design processes in all European FRC are to inform and direct the FRCs' and other non-proGIreg cities' replication processes of NBS (WP6), through a series of replication workshops (the first round of replication workshops focuses on replication in other parts of the

FRC; the second round of replication workshops targets replication of NBS in the FC and other, non-proGIreg cities in the region of the FRC).

Several exercises and tools with detailed, stepwise instructions are tailored to the principles and assist cities in structuring their co-design process:

The Vision 2030 helps to identify different perspectives and arrive at a common, agreed vision (chapter 4.1.). The Stakeholder Mapping Tool supports identifying stakeholders in a systematic way that should be engaged in the design and/or implementation of the NBS (chapter 4.2.). The Stakeholder Participation Spectrum allows for clarifying roles and responsibilities of the different stakeholders involved and making ambitions regarding stakeholder involvement explicit for a transparent participation approach. This tool shows how to differentiate between different types and intensities of stakeholder engagement for the NBS at hand (chapter 4.3.). The Participation Planner helps to define type and intensity of the envisaged engagement of each stakeholder group/beneficiaries as well as determine suited engagement formats. This is important since not every stakeholder might want to be involved in the same way (chapter 4.4.).

Lessons learnt from the co-design processes

Four stories of the three European FRC illustrate co-design process experiences for different NBS and how the principles were employed. For any replication efforts within proGIreg and beyond, the following points are of key consideration:

- Know your target group, their daily routines and needs to find anchor points for their engagement and design activities according to their needs.
- Engage stakeholders early in the process to create a sense of ownership for the NBS and increase the chance of their maintenance and caretaking beyond termination of a pilot project.
- Especially when working with disadvantaged groups**,** transparency is key to gaining trust, one of the most important assets in the management of such an initiative. Trust can be won by engaging users and intermediary NGOs directly and from the start.
- Identifying the benefits of an NBS for the target group and making them visible and valued is crucial but at times difficult. The more focused the NBS is on its target groups' benefits, the easier it is to communicate them and thus aid any co-creation process.

To garner citizens' support in general and marginalised groups in particular, it is crucial to frame NBS along the needs and interests of the particular group and their daily routines. In addition, it is recommended to be as concrete as possible in communicating the value of a particular measure using simple language, visuals and translation services as needed.

The FRC have different ways of navigating roles, responsibilities and pertinent governance arrangements for co-designing urban NBS, which are all equally valid (chapter 6.1.). Arrangements include public-private partnerships between municipal and non-municipal actors where the role of public officials vary between a coordinating role (chapter 5.3.) and a consultative/supportive role (chapter 5.2.). NGOs, associations or private actors are entrusted by municipal actors with the management and operation of the respective NBS, often on public space. At the same time, the latter often serve as strategic links between the municipality and citizens or marginalised groups. There are also arrangements characterised by interactive governance (chapter 5.1.), where several public and private stakeholders are involved in NBS

design and implementation and largely perform equal roles in formalised and non-formalised partnerships. The third governance arrangement observed is self-governance, characterised by the private sector or community organisations taking the lead while the public sector takes a supporting, responsive role. Citizens are perceived as equal partners in planning and power relations are well balanced between the actors. Thus, a high intensity of engagement can be achieved.

Finally, a reality check on the concept and application of co-design for NBS unveiled the necessity to identify and map common underlying parameters which might positively or negatively impact the co-design process (chapter 6.3.). Thought was given to how these parameters might affect both the timing as well as the intensity of the co-design process. A critical reflection on the latter in the planning phase helps to identify potential limits to co-design early on and communicate them transparently to interested stakeholder groups. The following four parameters were identified, their relevance for co-design outlined and implications for timing and intensity of co-design elaborated:

1) **Type of NBS**: due to their nature and the benefits they deliver, some NBS might garner more support and commitment than others; not all types of NBS are conducive to co-creation from the early stage of co-design, and/or to co-design that aims at a high intensity of stakeholder engagement.

2) **Land use requirements**: it is advisable to look for plots whose land use requirements fit with the intended use of the NBS. If land use is not in line with the envisaged use, another location will have to be searched for, which can affect the timing and intensity of co-design.

3) **NBS on private or public land**: most of the NBS (in proGIreg) are located on public land, with reason. Private land ownership often requires lengthy negotiations and a defined concept of use. Private landowners frequently have a lack of incentives for renting out plots for co-designing NBS, also with regards to the uncertainty with what is going to happen after the termination of the project.

4) **Construction and safety regulations and standards**: it is reasonable to check early if the envisaged NBS and its use comply with given construction and safety standards (i.e. accessibility of green roofs, statics of a building) and if there are any applicable permits that have to be applied for. Applications might delay the co-design and co-implementation process.

1. Introduction

1.1. Introduction to the project

Productive Green Infrastructure for post-industrial urban regeneration (proGIreg) is developing and testing nature-based solutions (following NBS) co-creatively with public authorities, civil society, researchers and businesses. Eight NBS, which will support the regeneration of urban areas affected by deindustrialisation, will be deployed in Dortmund (Germany), Turin (Italy), Zagreb (Croatia) and Ningbo (China). The cities of Cascais (Portugal), Cluj-Napoca (Romania), Piraeus (Greece) and Zenica (Bosnia and Herzegovina) will receive support in developing their strategies for embedding NBS at local level through co-design processes.

1.2. Introduction to the guidelines

These guidelines provide a practical guidance for setting up organizational and administrative structures suited to the planning and execution of local NBS co-design processes. It includes distilling transferable guidance on how to conduct co-design from outcomes and experiences of the NBS co-design processes in the three European Front Runner Cities (following FRC) Zagreb, Dortmund and Turin during the H2020 project proGIreg[1]. Between end of 2018 and the beginning of 2020, the authors facilitated and organised three consecutive co-design workshops for the NBS core team and additional relevant stakeholders in each FRC, and thus gained a thorough understanding of the local processes.

The co-design process in the European FRC addresses four overall objectives (see Table 1):

Table 1. Key objectives of co-design process in the European FRC

Objectives	Measures
Vision statement	● create an overarching Living Lab (following LL) narrative; ● how to employ technical and social innovations and design the experimentation process to bring about the desired transformation; ● identify transformation potential and potential risks and implications; ● cultivate a sense of ownership and a local identity within the LL;
Organisational structures	● establish management structure and definition of roles and responsibilities; ● create a work and time plan;

[1] There is a fourth FRC, namely Ningbo in China. Due to a delay in the approval of funding, Ningbo entered the processes later and thus, the co-design process is delayed also due to COVID-19 and cannot be captured here.

Stakeholder engagement	● involve and integrate marginalised communities in LL activities; ● ensure stakeholders' long-term commitment, which will be key for maintaining NBS throughout the project and beyond;
Managing transition processes	● facilitate the transition to the implementation phase; ● critically reflect on the co-design process and gather lessons learned in an iterative process.

Special emphasis was given to the engagement of marginalised communities in the LL activities, by developing an understanding of their specific needs, concerns and interests to determine pertinent design and implementation of the NBS in the LL (see chapter 5 – stories). The underlying objectives of engaging marginalised groups in the NBS co-design process are to lower barriers (i.e. cultural, socio-economic, physical, language,) compromising their equal participation in civil society and community activities; increase social inclusion to enable socially just plans and actions that reflect the needs of a wide range of groups in the local community; and improve healthy living conditions for residents of all ages and walks of life.

Reviews of similar approaches of other NBS projects highlighted the need for a concise, practical guideline, using simple language targeting practitioners. Many are lengthy, scientific documents, focusing on barriers and enablers rather than practical examples of how processes were organised and steered. As organisers of three consecutive co-design workshops in the FRC, the authors gained insight into the co-design process in each city. Taking the local and varied co-design processes in the FRC during proGIreg as the starting point for this document, the guidelines capture, and package relevant experiences and lessons learnt in the FRC. They aim at offering general and transferrable guidance on how to organise and steer NBS co-design processes in any city. For this reason, the document contains two parts that can be read and used independently of each other.

Part 1 is proGIreg specific: it explains the underlying co-design methodology and approach and clarifies pertinent terms related to co-design. In summary, it provides background information about the project and is targeting partners of the consortium, sister projects working on similar topics, as well as other parties interested in learning about the project.

Part 2 includes the actual co-design guidelines, a practical guidance on how to initiate, steer and organize collaborative design processes for the planning and implementation of NBS, together with multi-sectoral stakeholders (municipal departments, academia, the private sector, etc.) and the wider public. They target any party aiming to lead, organise or facilitate participatory multi-stakeholder engagement processes for NBS, especially municipal representatives. They start with outlining six guiding co-design principles. The guidelines also provide several exercises and tools with detailed, stepwise instructions which are tailored to these principles and assist in structuring the co-design process. Following, four stories of the three European FRC illustrate experiences with the co-design process for different NBS and in what way the principles were employed.

Part 3 summarizes the lessons learnt from the co-design processes observed overall. A reality check is performed on the concept and application of co-design for NBS in practice. Referring

to lessons learnt from the three cities, different governance and management arrangements are briefly compared and framework conditions limiting and enabling co-design are mapped.

Part 1

2. Urban regeneration through co-created NBS

2.1. What is urban regeneration?

Urban regeneration aims to improve economic, physical, social and environmental conditions of areas that are considered vulnerable and/or deprived (Tallon, 2013). It makes local authorities and stakeholders rethink their planning strategies in the context of limited space, deprived areas and social justice. Regeneration efforts can focus on building social cohesion, improving environmental conditions, local business development or improving housing (Tyler et al., 2013).

In proGIreg, urban regeneration targets post-industrial areas which have undergone a de-industrialisation process bringing about structural, socio-economic and societal changes as a result of closing down factories (FIAT plant in Mirafiori, Turin; Sljeme former meat factory in Sesvete, Zagreb) and coal mines (Hansa Coking Plant in the district of Huckarde, Dortmund).

Fig. 1: Coking plant Hansa, Living Lab Dortmund, district Huckarde | ICLEI

Fig. 2: Former Sljeme meat factory terrain, Living Lab Zagreb, district Sesvete | ZIPS

Post-industrial areas frequently suffer from a loss of identity, decline of social cohesion as well as aesthetic, environmental and economic degradation. NBS have great potential to address social, economic and aesthetic challenges and to make urban regeneration work with and for citizens. They can not only help improve living conditions and reduce vulnerability to climate change, but also provide measurable economic benefits to citizens and entrepreneurs. ProGIreg is implementing **eight types of NBS** (see also Annex 1) which cut across different challenges dimensions, including climate adaptation and mitigation, circular economy and resources use, as well as urban biodiversity (see Fig. 3).

For instance, Turin, as one of Italy's most economically important cities, has been transforming from an automotive industrial centre into a hub for start-ups and business innovation since the 1990s. Thanks to the introduction of networks of parks, green cycling lanes, and green corridors along rivers and former-railway lines in recent years, Turin now has more green space per inhabitant than any other Italian city.

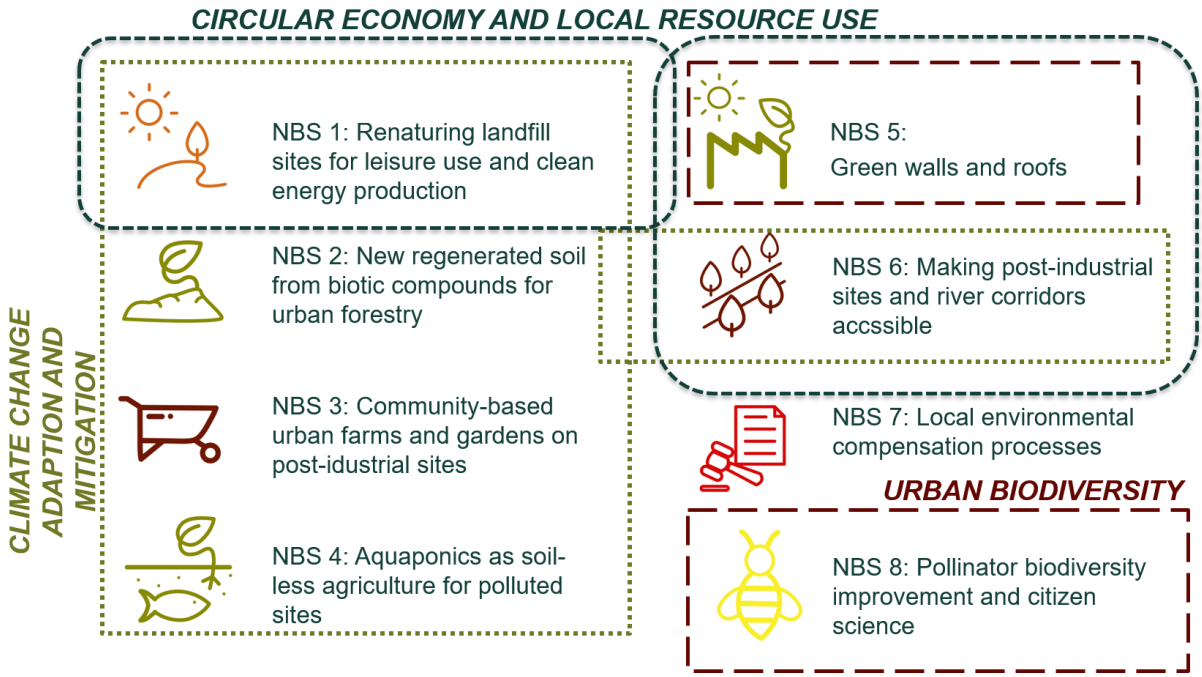


Fig. 3: ProGIreg's eight NBS to be tested, addressing different dimensions (A.Timpe, M.Olbertz RWTH)

Fig. 4: Orti Generali community gardens, Living Lab Turin, district Mirafiori Sud | Federica Borgato and Umberto Costamagna

2.2. What are Living Labs?

LL are geographically bound spaces (Voytenko, McCormick, Evans, & Schliwa, 2016, p. 4), meaning that their activities and processes take place in a defined area or site in real-life settings. This can be a region, city, district or particular neighbourhood (Breuer et al., 2017; Kobzeva & Knickel, 2018; Voytenko et al., 2016). As Fig. 5 shows, several NBS sites are located within the LL, which in proGIreg forms part of a larger regeneration area or district[2].

There is a variety of different Living Lab typologies and concepts, some of which emphasize the technological innovation and user-based knowledge for commercialisation of that innovation whilst others focus on social innovation – with social innovation labs.

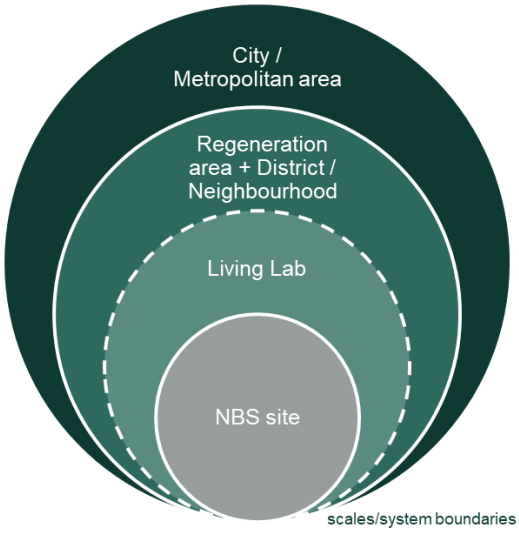


Fig. 5: Concept and scales of Living Labs in proGIreg

ProGIreg understands LL as specific areas or neighbourhoods where social, economic and technological ideas and concepts are developed and tested in real-life settings. ProGIreg employs LL in which the different types of NBS are (co-)designed, (co-) implemented and (co-) managed and maintained (Voytenko et al., 2016) (see Fig. 6).

Such LL aim at stimulating urban sustainability transitions and are based on the idea of active citizen involvement to strengthen democracy and social justice in the city. One main characteristic of all types of LL is testing and experimentation: stakeholders jointly explore, experiment and evaluate new products, services or ways of living to produce innovative solutions to real-world challenges (in their actual social, cultural, environmental contexts). Local authorities play a key role in creating these spaces and facilitating urban sustainability transition processes (Voytenko et al. 2016).

Thus, Living Labs are both a physical arena and an approach for collaboration and experimentation (Voytenko et al., 2016). As such, they have the potential to create solutions that respond to and are tailored to the local context, its challenges and the local communities' needs. Indeed, local knowledge can inform and improve the design and implementation of an

[2] For detailed maps of the different LL, please refer to Annex 1.

NBS. As daily users of a specific NBS site to be implemented, local communities can provide valuable knowledge on how they value the place and how they use it or want it to be used in the future. Involving this so-called tacit or experiential knowledge can create a better understanding of how an NBS can be best tailored to the local context (Breukers & Jeuken, 2017).

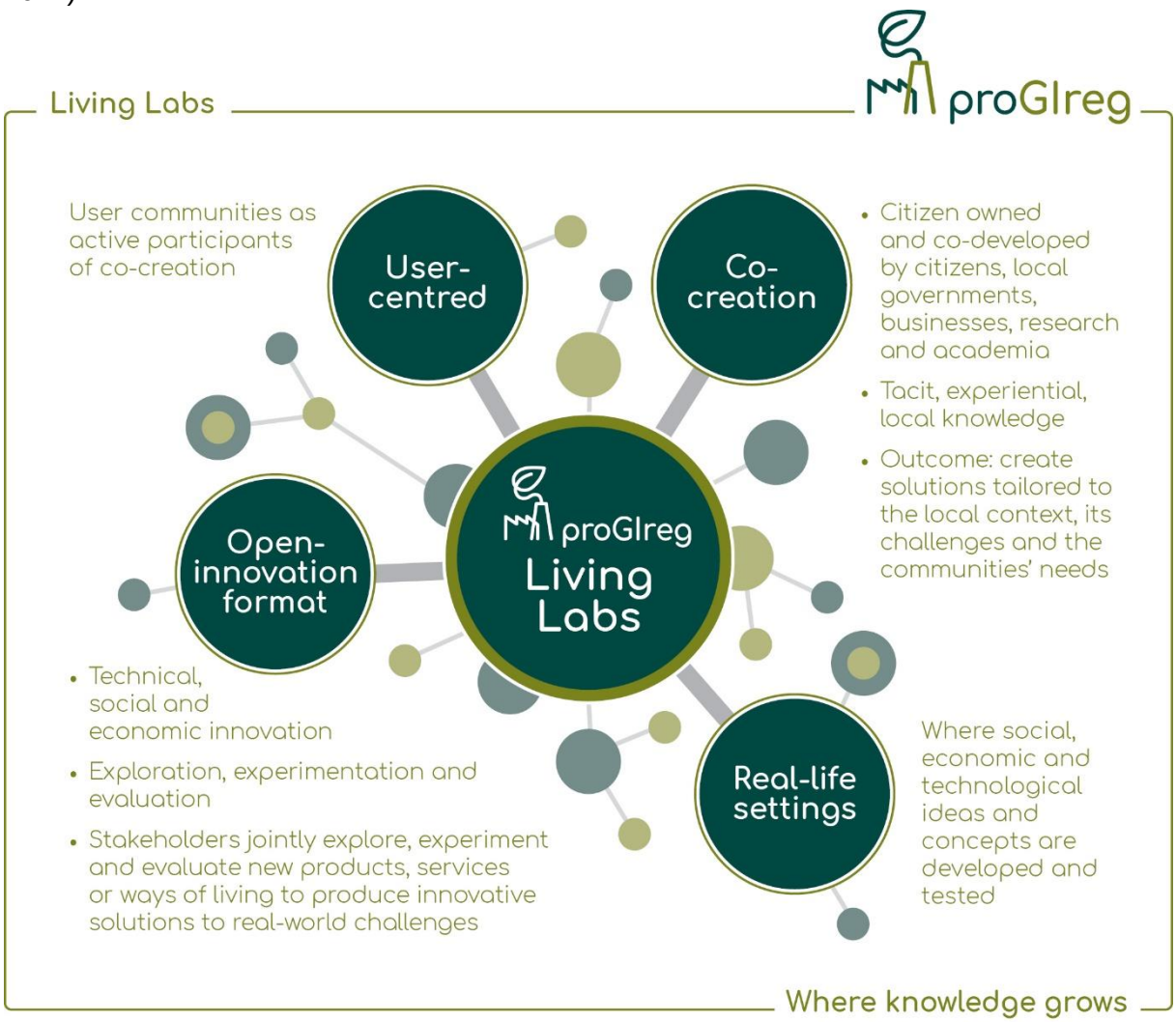


Fig. 6: Features of Living Labs in proGIreg (modified from https://sustainability.leeds.ac.uk/leeds-living-labs-one-year-on**)**

2.3. How can Living Labs foster urban regeneration?

Given the context-specific nature of Living Labs and, in our case, the NBS therein, any planning consideration should start from a place-based approach (see Buizer, Arts, & Westerink, 2016; Frantzeskaki & Kabisch, 2016). Not only does the type of place suggest which solutions or features are suitable for it; also, for the local community, sites are often imbued with individual or collective meaning which can create a sense of connection, identity and belonging.

NBS and urban green spaces not only deliver ecological functions, but also important cultural and social ones, such as recreation and space for social exchange (City of Copenhagen, 2016). Thus, they are especially suited to enhance the existing identity of a place or collectively reimagine and reinvent its identity. In fact, doing so is imperative for creating successful NBS.

The concept of Placemaking aims to connect people and places. It is both an overarching idea and a practical community-based approach for improving a neighbourhood, district or city and its community. It looks into everyday practices and how local, tacit knowledge can be used to improve the community and its place. A placemaking planning and design approach starts with identifying ideas, values and needs of the local residents, in order to make these ideas and values key components of urban regeneration plans (Breukers & Jeuken, 2017).

2.4. Co-creation as an integral element of Living Labs

ProGIreg understands its LL as citizen- and user-centred, meaning that active citizens' participation and empowerment are a key ingredient and an important component of proGIreg's overall concept.

A broad range of terms is in use to describe collaborative relationships and processes, such as co-creation, co-production, participation, quadruple-helix model or co-governance (see Baccarne et al. 2014, Schuurman and De Marez 2012, Westerlund and Leminen 2011). Co-creation is broadly understood as an active engagement of stakeholders who hold different types of knowledge and resources with the aim to generate collaboratively outcomes (i.e. vision narratives, new understandings of problems and opportunities etc.) (Voorberg et al., 2015).

ProGIreg pursues LLs in which citizens are involved as a source of co-creation to increase social acceptance, foster support and plant the seed for co-implementation and co-maintenance of the NBS (Breuer et al., 2017; Breukers & Jeuken, 2017). Active engagement from the very beginning is likely to produce mutually valued outcomes and can thus build ground for trust, responsibility and ownership of the NBS infrastructure (Breuer et al., 2017; City of Kopenhagen, 2016; Hansen, Rall, Chapman, Rolf, & Pauleit, 2017). Thus, co-creation is understood as the systematic involvement of all relevant stakeholders from the start to the end of a project (and beyond), in order to achieve mutually valued outcomes.

It is about involving citizens and civil society, government, the private sector, and research and academia (see **quadruple helix approach** and Fig. 5) in participatory, trans-disciplinary and multi-stakeholder processes for the co-design, co-development, co-implementation and co-evaluation of NBS. Together with the active engagement of disadvantaged social groups (e.g. social housing inhabitants, refugees or disabled people), this approach aims to enhance stakeholder and citizen ownership of the nature-based solutions created.

What differentiates co-creation from more traditional forms of stakeholder engagement is the intensity of involvement and the impact of societal actors in and on processes (Schaepke et al., 2018; Voorberg et al., 2015). Following the Public Participation Spectrum, stakeholder engagement can range from consultation, involvement, collaboration, to empowerment (see Table 2) (International Organization for Public Participation, 2014). These differ with regards

to the extent of power and influence stakeholders have on decision-making processes and on the development of the final solution. The further to the right, the more balanced the power distribution between stakeholders and public authorities becomes. Co-creation is ideally located further to the right in “collaborate” or “empower”.

Fig. 7: Quadruple helix approach

Table 2. Public Participation Spectrum

INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Table 3 illustrates the different government roles in the different possible governance arrangements along the spectrum (which was adjusted for the purpose of GI). Towards the right, the government role changes from a leading one to an enabling one.

Table 3. Spectrum of government and non-government roles in different governance arrangements developed in Green SURGE (Source Template: Mattijssen, T., et al., The 'green' and 'self' in green self-governance – a study of 264 green space initiatives by citizens. Journal of Environmental Policy & Planning, 2017)

Government actor role	Leading ⟷ Enabling					None/ regulatory
Form of Non-government actor participation in governance	Information	Consultation	Involvement	Partnership	Empowerment	
Non-government actor role	Provide information and views about UGI plans and projects as part of decision making process		Some involvement in planning, management, care and maintenance of UGI	Shared roles and responsibilities around planning and management of UGI	Leasing or purchasing of public land	Management agreement, leasing or purchase of private land
Governance model	Government actor led Consultative Democratic processes		Co-management	Co-governance/ co-production Consensus oriented	Non-government actor led governance Self governance	

In practice, there are limits to participation. Different contexts, determined for instance by the particular NBS chosen (for example technological expertise required with aquaponics (NBS 4) vs. urban gardening (NBS 3) or the number of people involved, might require differing levels of participation. We therefore suggest to perceive the different levels of engagement as gradients (Menny, Voytenko Palgan, & McCormick, 2018).

2.5. Co-creation process phases in proGIreg

Co-creation includes the phases of co-design, co-implementation, co-maintenance / co-evaluation of NBS. As illustrated in Fig. 8, the guidelines capture the first stage in the co-creation process for NBS since the FRC have only begun to co-implement in January 2020.

Understanding the local context and social fabric in a given LL is critical for providing effective support to the co-design process. A thorough spatial analysis of the LL area and the wider regeneration district beforehand helps to understand the context-specifics of each LL and the NBS to be implemented. The findings from that exercise can then either be fine-tuned and/or possibly changed during the inherently dynamic co-design and co-creation processes.

Such a spatial analysis preceding the co-design phase was performed by all FRC for the LL scale (by the Follower Cities who will develop urban regeneration plans at that scale: the local level of the regeneration areas) and the city/metropolitan scale in proGIreg, through T.2.1 (Elisei & Leopa, 2018). It aimed at assisting cities to generate a comprehensive spatial database as baseline input („state of play") for further activities in the project. This included

rendering a holistic picture on the specific local issues and challenges in the FRC (and FC) and provide contextual information to support the co-design activities (T2.2) and NBS pilot implementation (WP3).

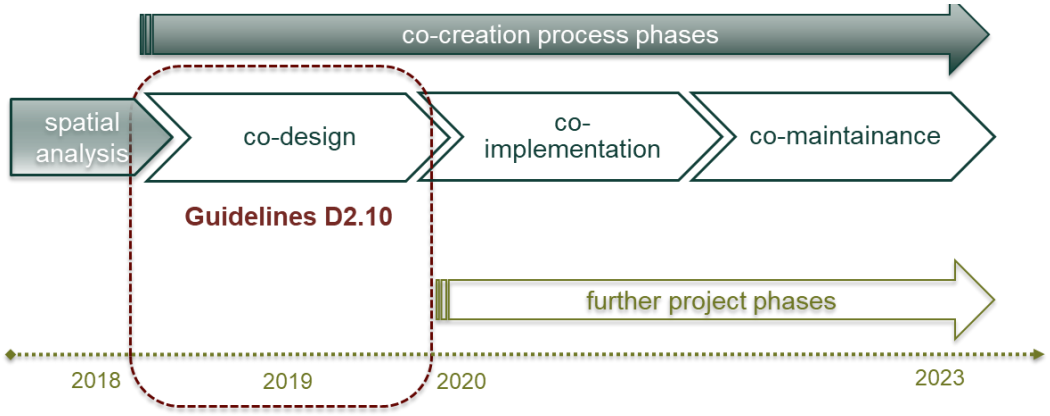


Fig. 8: Illustration of co-creation phases in proGIreg.

SWOT analyses of the LL / urban regeneration area formed part of this spatial analysis. It creates an understanding of LL / urban regeneration area, its challenges and specificities. A SWOT analysis can support making informed decisions about which type of NBS is the best fit and where it might create sustained social impact. A good NBS fit responds to or addresses the specificities and challenges of an area. The SWOT analysis can be performed both at the city/metropolitan area level and LL / regeneration area level, depending on availability of (geo)data and the specific purpose for conducting the SWOT analysis[3]. The template shown in Table 4 was used by the FRC and FC to perform the SWOT analysis based on the data generated. It follows proGIreg's four key scientific impact assessment domains of the NBS benefit assessment and monitoring (listed in the first column) (Elisei & Leopa, 2018).

Table 4. Template SWOT analysis

	Strengths	***Weaknesses***	***Opportunities***	***Threats***
Socio-cultural inclusiveness	E.g. Low median age –active population	E.g. Higher material deprivation rate –enclavisation		
Increased human health and well-being				

[3] For more information on the spatial analysis approach in proGIreg, refer to: **https://progireg.eu/fileadmin/user_upload/Deliverables/D2.1_proGIreg_Methodology_Spatial_Analysis_URBASOFIA_2019-05-02.pdf**

Ecological and environmental restoration				
Economic and labour market benefits				

To provide an easy-to-understand visual assessment of the data collected and conclusions drawn, the findings were depicted in thematic maps based on the assessment categories (left column) (see Fig. 16). Suggested synthesis aspects are the i) degree of connectivity / fragmentation of green areas in the city, ii) deprived neighbourhoods with social problems, iii) areas with population density outside the radius of a green space (3oom), iv) property values in conjunction with GI, etc.

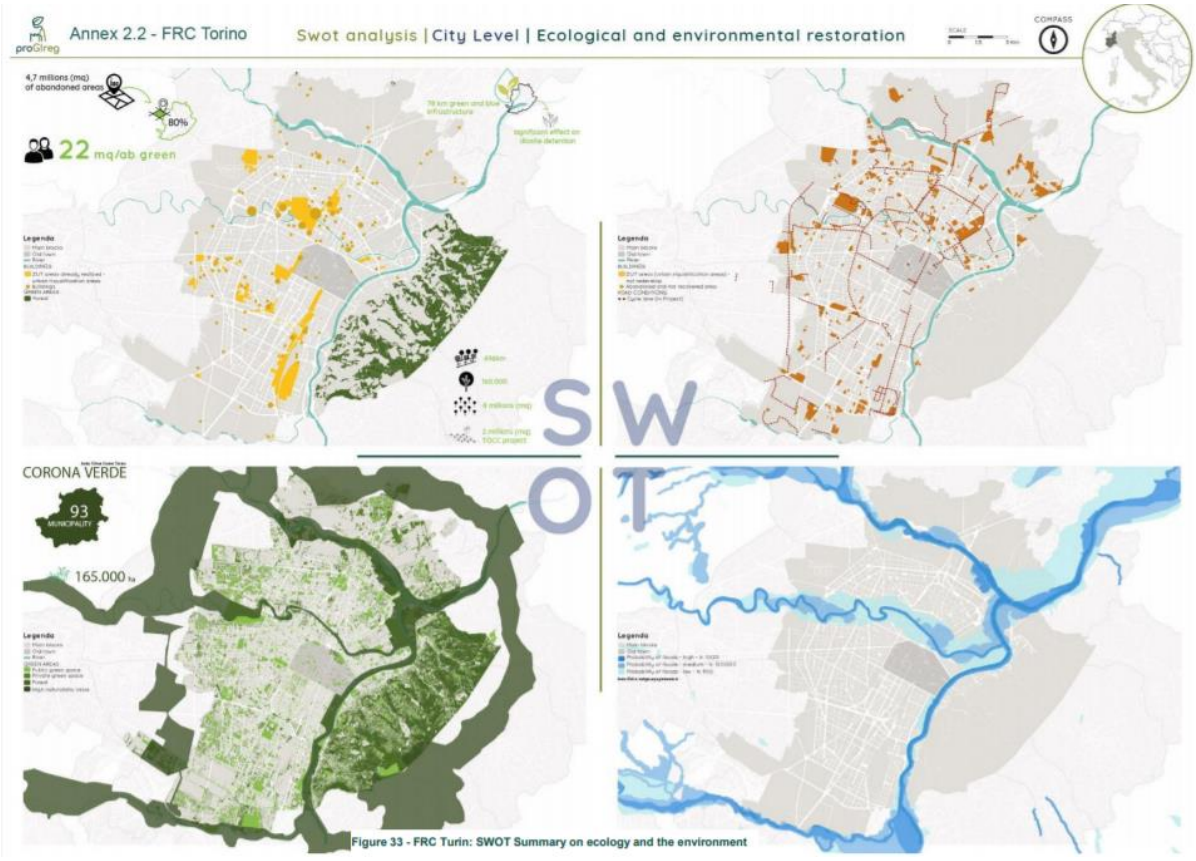


Fig. 9: Illustration of Spatial Analysis SWOT summary for Turin - ecology and the environment. Source: proGIreg D2.2

Selected components of the spatial analysis developed in Task 2.1 have been essential to inform the co-design process and workshops. The following three elements were actively built on:

- **Stakeholder mapping performed in the FRC:**
  The spatial analysis differentiated between primary and secondary stakeholders which were mapped in each of the cities. The former is characterised by a high level of interactivity and are thus vital for the success of the project. The latter affect or are affected by the project and its results but are not essential for its success.
  The initial stakeholder list (created by FRC in the spatial analysis) served as a starting point during the first co-design workshop to reassess position and importance of stakeholders and stakeholder groups in terms of interest and influence (see chapter 4 – tools and instruments for co-design), and identify potential gaps in the current set of stakeholders per NBS. This was important since at that point preparations for NBS had advanced and some of them had changed in terms of location and/or conception. To move on from the mapping to more concrete engagement formats, it seemed useful to further differentiate the stakeholders mapped according to the envisaged level and intensity of their engagement (i.e. consult, involve, partner, empower) per NBS (see chapter 4.4. participation planner).

- **SWOT analysis:**
  The co-design process could to be tailored to local needs based on the SWOT analysis. Not only did it help to gain an understanding of the main challenges of the urban regeneration area that an NBS is supposed to address, but also of how vulnerable groups are constituted and defined within the LL area. This formed a starting point for tying them into co-design activities, assessing planned NBS in terms of the values created for those groups and how these can be communicated.
  The spatial information and maps generated in Task 2.1 further gave rise to the elaboration of so-called “Living Lab Vision Maps”. The latter capture the results of the co-design process and activities undertaken and underway in each LL. In a visual and concise format, these vision maps represent the overall vision for the entire LL (elaborated during the co-design workshops= and its envisaged future development (see Annex for Living Lab Vision Maps of Turin, Zagreb and Dortmund). They will further be used and expanded during the co-implementation process in Work Package 3.

- **Plans and policy frameworks in the FRC:**
  The overview of relevant plans and policy framework in each FRC helped to understand the framework conditions in each of the cities and how they might hamper or enable NBS implementation.

Part 2

3. Co-design guidelines

3.1. Why these guidelines? Who are they for?

The purpose of this document is to provide practical guidance on how to initiate, steer and organize collaborative design process for the planning and implementation of NBS, together with stakeholders (such as the city administration, academia, the private sector, civil society associations, land owners, real estate managers) and the wider public. The objective is to tailor NBS planning and implementation processes to the interests and needs of different groups of society, with a special focus on vulnerable groups, such as long-term unemployed, migrants, socio-economically or otherwise disadvantaged people. This shall help achieve and develop mutually valued outcomes with the potential to be sustained and maintained into the future.

The guidelines target anyone aiming to lead, organise or facilitate participatory multi-stakeholder engagement processes for NBS and set up respective structures for collaboration, especially municipal representatives. The guidelines attempt to address – as much as possible – parties with different levels of experience with stakeholder engagement processes.

The guidelines build on practical experiences and knowledge gathered of co-creating NBS in Dortmund, Zagreb and Turin but are conceptualized in a way to support other cities in future replication and upscaling of NBS. For instance through providing tested co-design principles and tailored tools.

3.2. Approach

The guidelines are based on two components and their underlying approach:

- Six clear and easy-to-use co-design principles with practical illustrations of their application in “stories” from the proGIreg case cities (→ chapter 3.3 and chapter 5) and a checklist for self-assessment on the integration of these principles in activities and processes (→ chapter 3.4).
- Recommended exercises with detailed instructions and templates for co-designing NBS that build on each other and can be applied for organizing and steering co-design processes in multi-stakeholder contexts (→ chapter 4: tools and instruments for co-design)

WHY DO WE USE CO-DESIGN PRINCIPLES?

Effective governance and co-creation of NBS depends on strong roots, or core principles that underpin the design (and implementation) of initiatives. Few other NBS projects[4] which

[4] **H2020 Project NATURVATION**

assessed several NBS initiatives have developed a strong root system where several such principles are employed together to ensure the sustainability of NBS (Bulkeley, 2019). The principles govern the entire co-creation process from co-design, to co-implementation, and co-maintenance. They are meant to guide co-design-oriented planning and decision-making processes in a LL context. Anticipatory (co-)design can help identify potential flaws already during the planning phase when they can still be corrected or mitigated, rather than in the implementation phase when they are more difficult to tackle. They can be used flexibly and adjusted to different contexts and processes.

Applying the principles can lead to the following desired outcomes:

- → Creating and enhancing local sites and local identity;
- → Generating knowledge for the real world through the LL that can trigger societal, technical, economic and management changes;
- → Showing new possible planning and management structures, e.g. using more bottom-up approaches with community engagement;
- → Engage multiple stakeholders in co-creating LLs.

To assist stakeholders in achieving these outcomes, we create a checklist based on which stakeholders can assess which of these principles and to what extent they are considered in current and future processes.

The co-design principles, the self-assessment checklist as well as the recommended tools and instruments can also be applied during co-implementation. Thus, they can be used in an iterative manner to critically revisit objectives, stakeholder mapping and engagements formats later on and be adjusted, if necessary.

3.3. The 6 principles of co-design

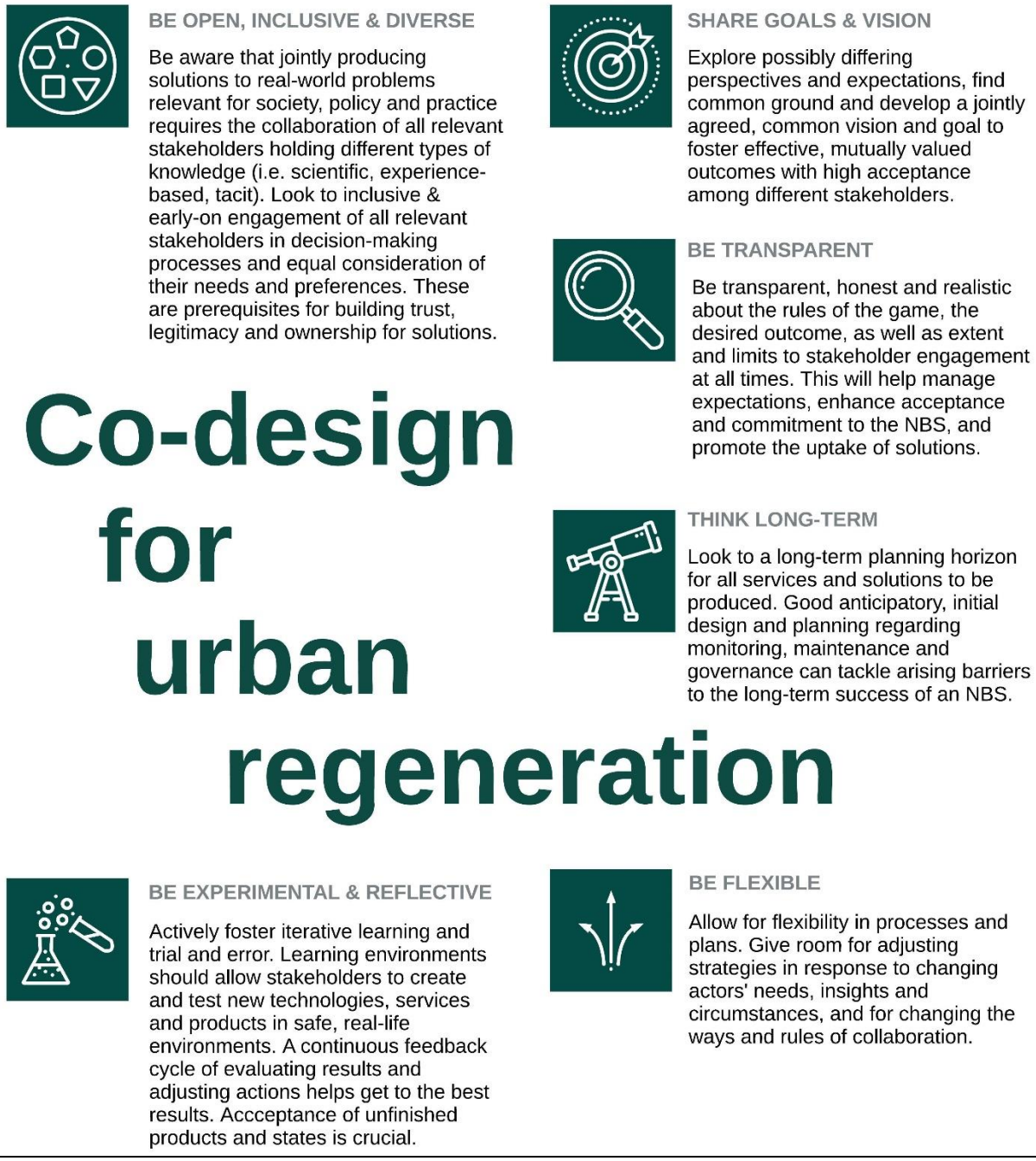


Fig. 10: Co-design principles

3.3.1. Be open, inclusive & diverse

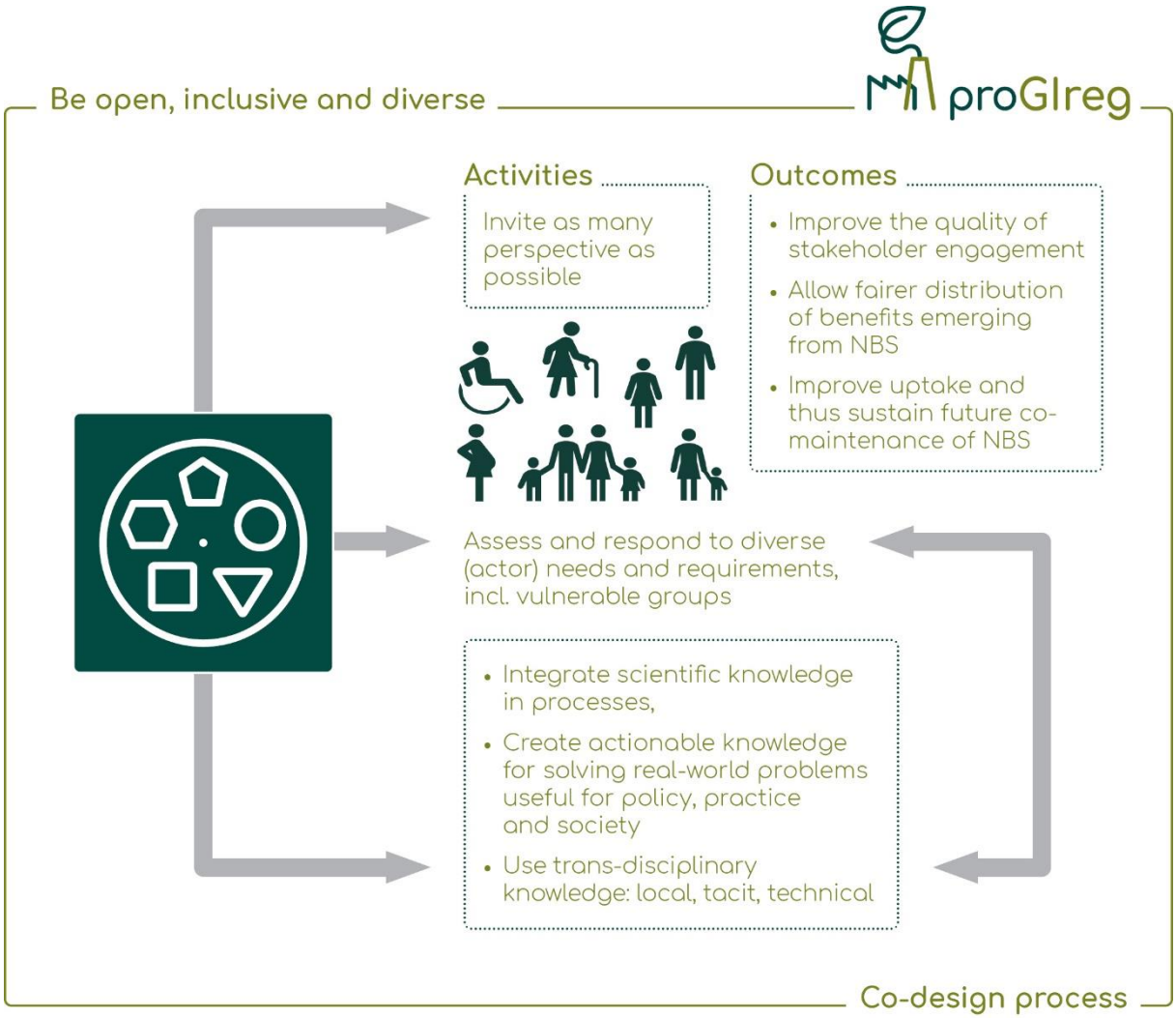


Fig. 11: Co-design principle: be open, inclusive and diverse

Co-design processes should be organised in a way that different types of knowledge, perspectives and needs are invited and addressed. Making activities open and accessible and inviting as many perspectives as possible into the processes can improve the quality of stakeholder engagement, allow for a fairer distribution of benefits emerging from the NBS and approaches to solving a problem. This includes assessing and responding to diverse (actor) needs and requirements, especially those of vulnerable social groups that affect and/or are affected by the NBS and their outcomes (i.e. migrants, elderly people, people with disabilities, etc.), but also including different types of knowledge, such as scientific, local, tacit or experiential knowledge (Breukers & Jeuken, 2017).

LL integrate scientific knowledge in processes, but also create so-called actionable knowledge: knowledge about solving real-world problems which is useful for policy, practice and society (Frantzeskaki & Kabisch, 2016; Menny et al., 2018; Schaepke et al., 2018). To do so it is imperative to include different types of knowledge from diverse actors: both transdisciplinary knowledge that is important to address technical issues of NBS, but also more experience-

based, tacit and local knowledge, of local communities, its history and how spaces are being used by residents in order to tailor the type of NBS to their neighbourhood.

During the assessment of how the NBS will affect each stakeholder group and caters to their needs it is not only imperative to identify those who benefit from NBS but also to make their multiple benefits visible and valued (Bulkeley, 2019). This will promote uptake and sustain future co-maintenance of NBS (Breukers & Jeuken, 2017).

3.3.2. Share goals & vision

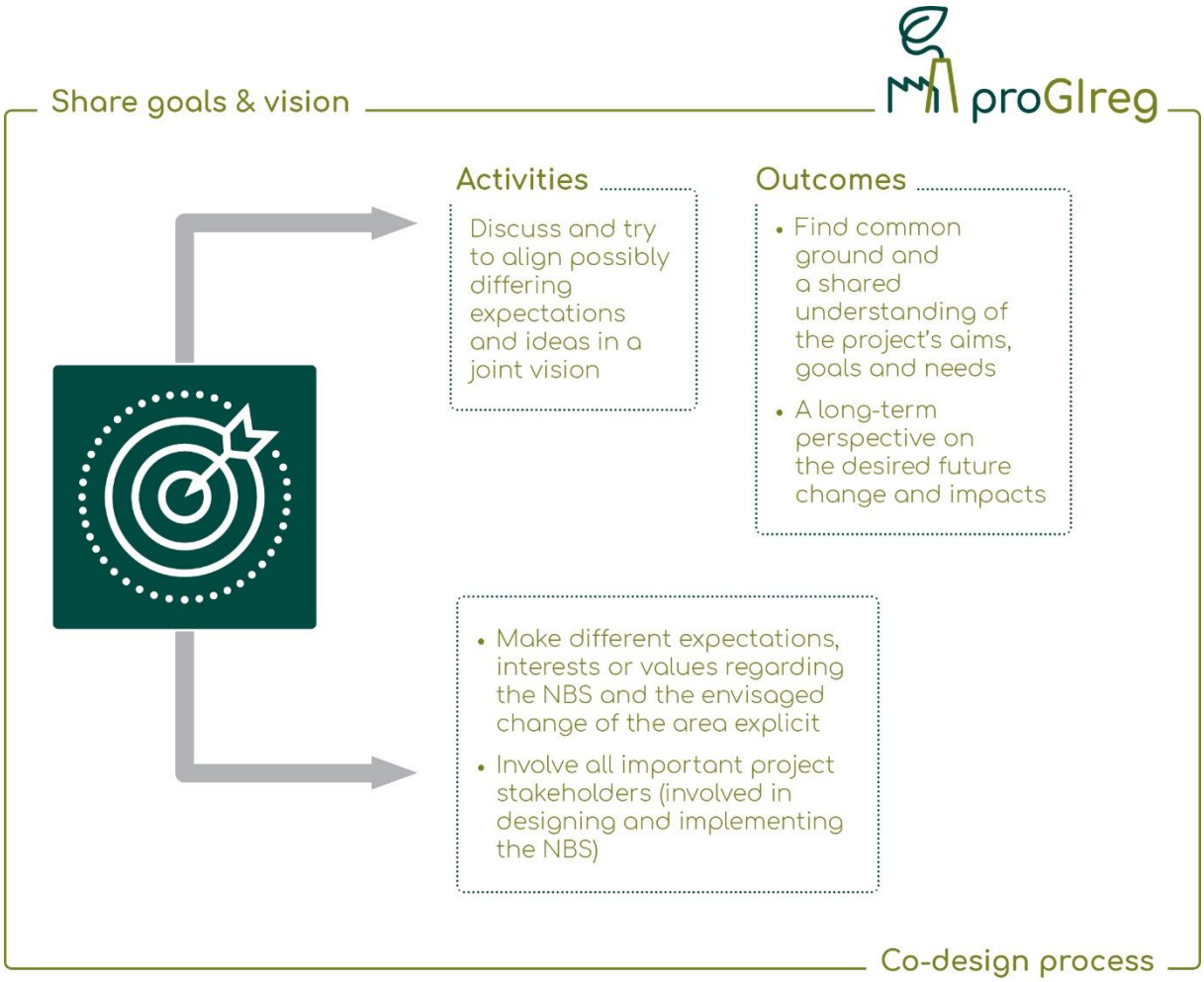


Fig. 12: Co-design principle: share goals & vision

Stakeholders might have different expectations, interests or values regarding the NBS to be implemented as well as the envisaged change (urban regeneration) of the area. These need to be made explicit and managed. Thus, discussing and trying to align possibly differing expectations and ideas in a joint vision is ideally one of the first and important steps in the co-design process. It is important that all project stakeholders (involved in designing and implementing the NBS) find common ground and a shared understanding of the project's aims, goals and needs (Breukers & Jeuken, 2017).

A shared goal and vision represent a long-term perspective on the desired future change and impacts on the area after termination of a project – in other words, the desired outcome of the implemented NBS in the Living Lab area. Such a vision can be more or less detailed, drawn, using imagery or storytelling, or formulated in a slogan or mission statement to be frequently revisited and adjusted, if necessary (→ Vision 2030, see chapter 4.1.). Ideally, in a next step, the visioning process should be extended to the local community to enhance legitimacy and create ownership of the objectives and vision. This could be done through focus groups, a citizen-sourced input approach for the vision, or by co-defining priorities together with local community groups and businesses (Hawxwell et al., 2018).

With a view on establishing linkages to city/district policies and programmes as much as possible, it is important to create a broader vision and goal for the area or district that goes beyond the outcomes of the individual NBS and LL's vision. Garnering wider policy support of NBS, for instance through integrating NBS as a strategic element in urban plans or strategies, into public works tenders or planning tools, can positively impact on sustainable implementation, long-term viability of the NBS and foster replication in other parts of the city. At the same time this can promote inclusive policy making since such a vision is essentially bottom-up that residents of the area have developed and can subscribe to.

3.3.3. Be transparent

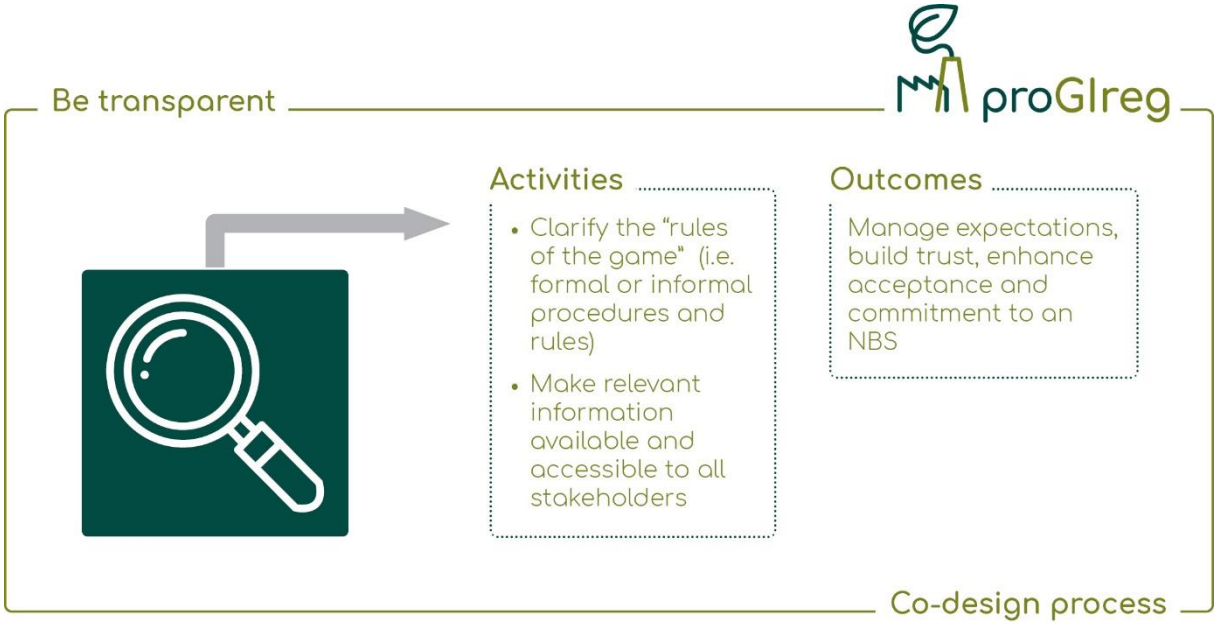


Fig. 13: Co-design principle: be transparent

Transparency from the very start of the co-design process is of utmost importance. It helps to manage expectations, avoid disappointment, build trust, enhance acceptance and commitment to an NBS and thus strengthen its uptake and use into the future. It also ensures good relationships between the stakeholders involved (resulting from perceived fairness in the process) (Breukers & Jeuken, 2017).

Transparency has different dimensions:

5) clarity of the “rules of the game”, which refers to formal or informal procedures and rules that apply to the stakeholder engagement process (Breukers & Jeuken, 2017) which should be communicated in a clear and concise way. This involves defining the framework conditions that involved stakeholders should be aware of and adhere to (i.e. timeline and phases, objective, rules of conduct, mandates and scope of influence).

6) clarity of the extent and goal of stakeholder engagement, which refers to clarity of the desired scope and intensity of engagement of stakeholders. In other words, the participating parties should be aware of what is expected from them and of the extent to which they are allowed to influence and engage in the design, implementation and maintenance of the NBS (→ participation planner, chapter 4.4.).

7) clarity of what will be done with the inputs provided by stakeholders, which is closely linked with the previous dimension. Related information should be made available and accessible to all stakeholders and potential participants.

3.3.4. Think long term

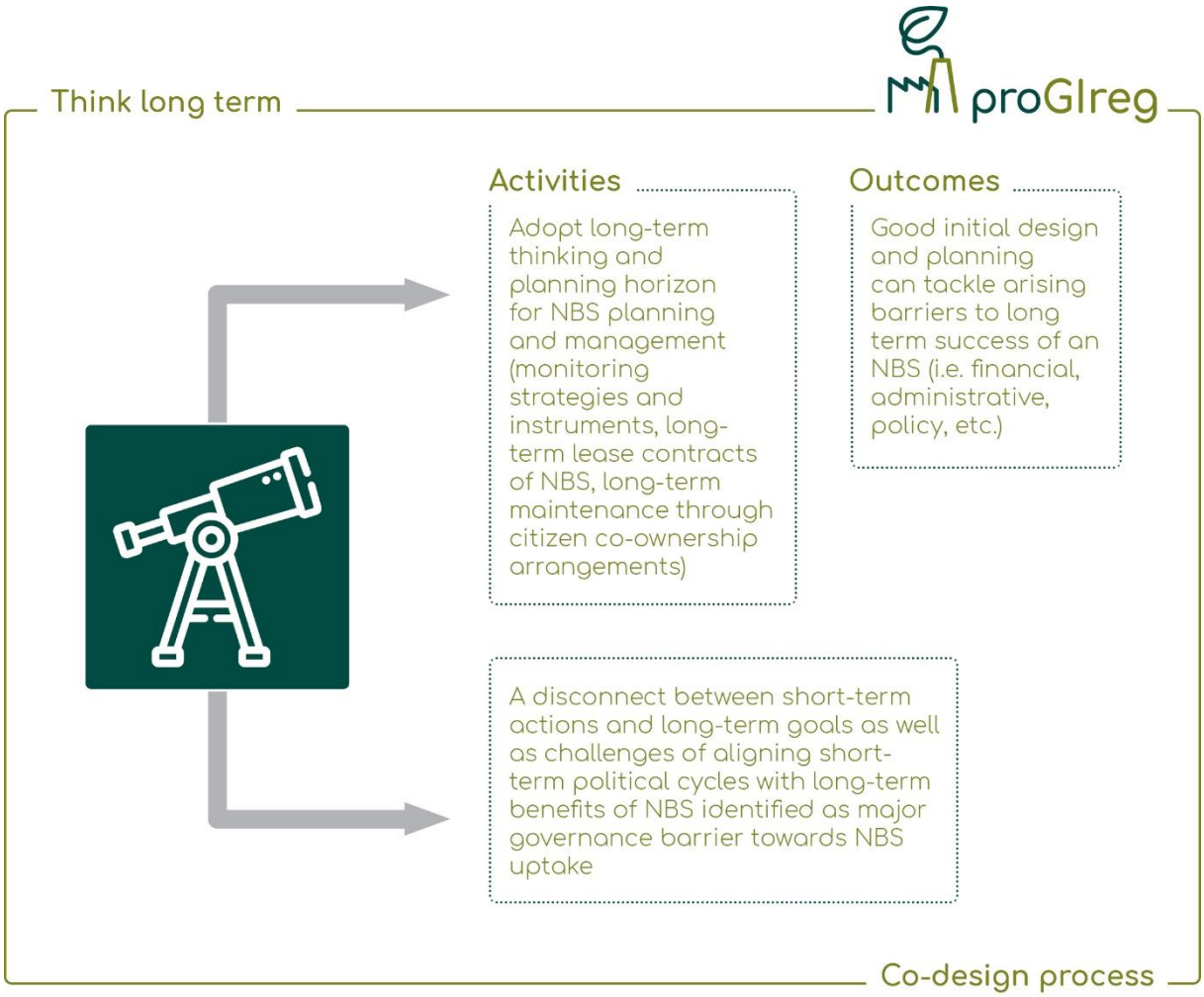


Fig. 14: Co-design principle: think long term

Depending on the complexity, NBS can be implemented in the short to medium term. Whilst environmental benefits such as carbon sequestration or a decrease in the urban heat island effect can be assessed in the short term, social or economic benefits as well as (in this case) the envisaged urban regeneration as a desired result of the NBS only unfold in the long run (Kuban et al., 2018). Indeed, a disconnect between short-term actions and long-term goals as well as challenges of aligning short-term political cycles with long-term benefits of NBS have been identified as a major governance barrier towards NBS uptake (Breukers & Jeuken, 2017; Hawxwell et al, 2018).

The NBS and their management processes should thus exhibit long-term thinking and planning horizon beyond the existence of a respective project (Schaepke et al., 2018; Wittmayer, van Steenbergen, Frantzeskaki, & Bach, 2018). Good initial design and planning can tackle arising barriers to long term success of an NBS (i.e. financial, administrative, policy, etc.). This includes the definition of monitoring strategies and instruments, long-term lease contracts of NBS or taking measures for long-term maintenance of the infrastructure and services through citizen co-ownership arrangements. Co-management and grassroots initiatives show that communities are able to manage green space for long periods of time (Hansen et al., 2017).

3.3.5. Be experimental & reflective

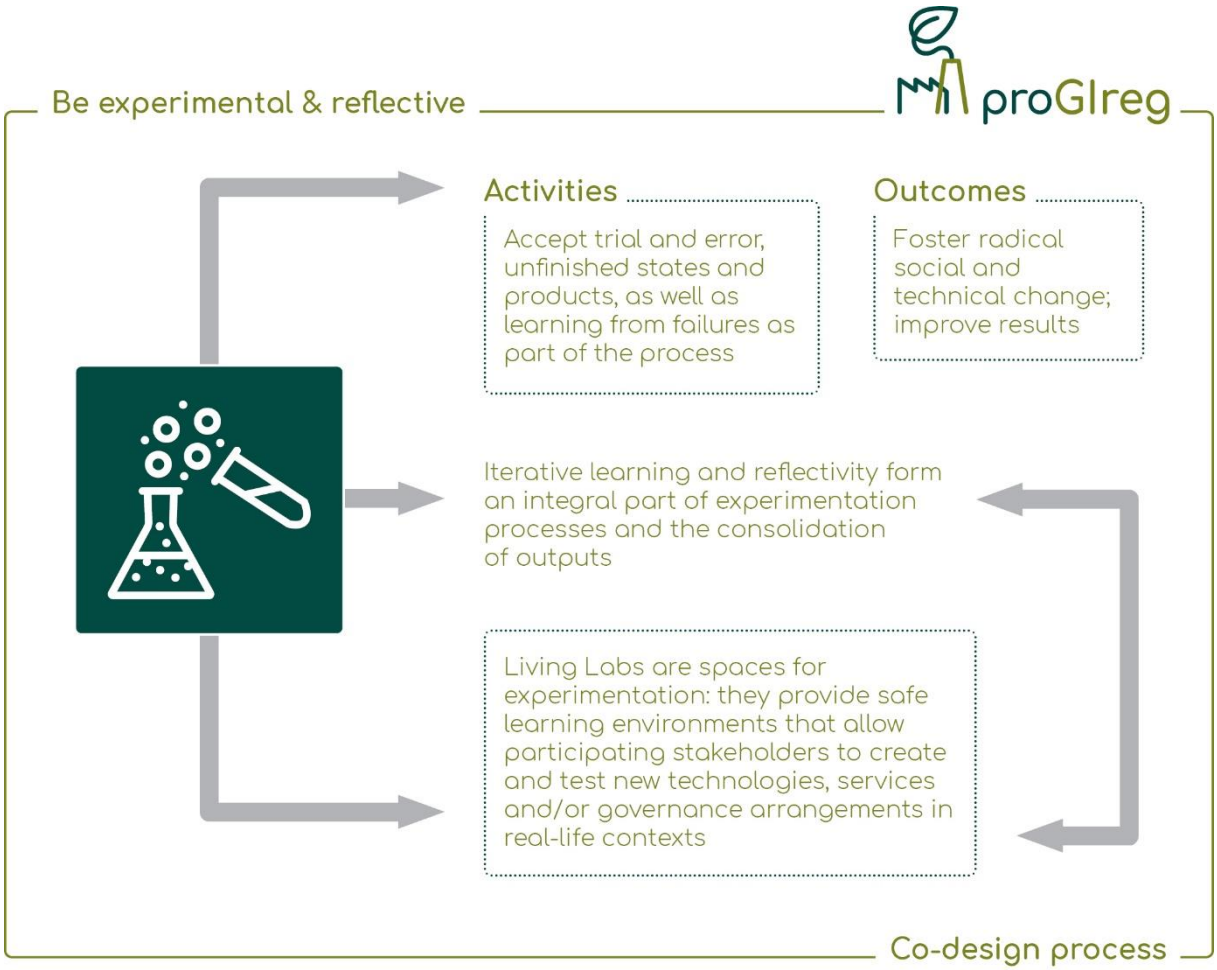


Fig. 15: Co-design principle: be experimental & reflective

LL are by definition spaces for experimentation. Ideally, they provide safe learning environments that allow participating stakeholders to create and test new technologies, services and/or governance arrangements in real-life contexts. Such testing in real world conditions has the potential to foster radical social and technical changes (Castán Broto & Bulkeley, 2013; Voytenko et al., 2016).

Iterative learning and reflectivity form an integral part of experimentation processes and the consolidation of outputs. Knowledge is created by collecting experience, reflecting on it and formulating conclusions. Following the non-linear process of design thinking, a continuous feedback cycle of evaluating results and adjusting actions and objectives helps to improve results (Parodi et al., 2018; Schaepke et al., 2018; Wittmayer et al., 2018). This demands acceptance of trial and error, unfinished states and products, as well as learning from failures as part of the process.

3.3.6. Be flexible

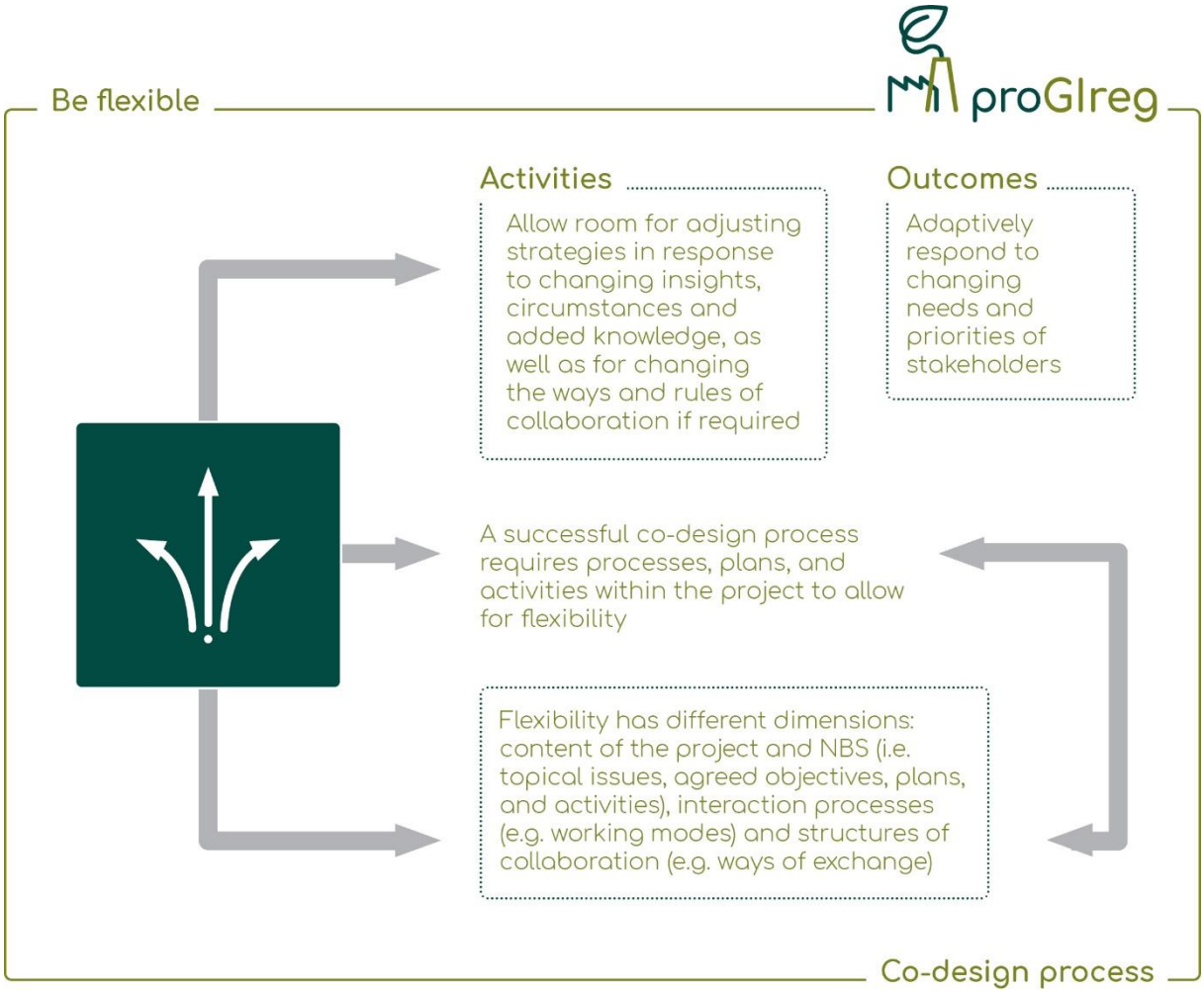


Fig. 16: Co-design principle: be flexible

A successful co-design process requires processes, plans, and activities within the project to allow for flexibility and to adaptively respond to changing needs and priorities of stakeholders. Flexibility has different dimensions. It relates to the content of the project and NBS (i.e. topical issues, agreed objectives, plans, and activities), interaction processes (e.g. working modes) and structures of collaboration (e.g. ways of exchange).

There should be room for adjusting strategies in response to changing insights, circumstances and added knowledge, as well as for changing the ways and rules of collaboration if required (Breuer et al., 2017; Nevens et al., 2013; Senatsverwaltung für Stadtentwicklung und Umwelt Berlin, 2012; Wittmayer et al., 2018).

3.4 Checklist co-design for self-assessment

Be open, inclusive and diverse

☑ Which are the main social, economic and environmental challenges, strengths and weaknesses of the area/district/neighbourhood (in which the NBS will be implemented) the planned NBS and activities will address? In what way?

☑ Have you assessed local communities/residents' needs and expectations (i.e. through interviews, workshops, consultations, questionnaires, etc.) and how are they considered in the (1) design and (2) implementation and (3) maintenance of the NBS?

☑ How have you identified distinct groups of residents with a potential interest in engaging actively in the co-design, co-implementation and co-maintenance of the NBS to be implemented? Have you also identified and differentiated different types of engagement envisioned for the different stakeholder groups?

☑ How do you safeguard early engagement of the local population with the project (i.e. collaboration with organized networks and intermediary organisations, reach out to champions in community groups)?

☑ How are your public gatherings, events and NBS-related activities organized in an informal way, open to new and different actors, different perspectives (i.e. scientific disciplines, gender, culture, socio-economic status), types of knowledge (scientific, tacit), suggestions and contributions?

Be transparent

☑ How have you taken measures to promote your initiative publicly and make the local residents aware of the option to co-design and co-implement? In other words, how do local residents know that they can influence the planning and design of the NBS?

☑ How are you transparent with regards to the desired outcome of your plans and scope of action? Have you communicated them to the participating parties?

☑ How are you transparent with regards to the 'rules of the game'? Have you clarified the rules of the participation process towards the participating parties?

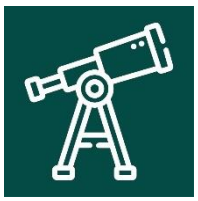
☑ How are you transparent with regards to the aim of community participation and how inputs by residents/plot holders will be used?

Share goals & vision

☑ Is there a clear, mutually agreed vision of the LL and its expected outcomes (i.e. manifest)?

☑ How have you made sure that all necessary stakeholders buy into this vision and are taken on boards, i.e. land owners, private sector actors, etc.?

☑ How do you make sure that project activities and steps taken in the project align with this vision?



Think long term

☑ Have you taken action to safeguard long-term use and maintenance of the NBS developed in proGIreg even after termination of the project?

☑ Have you identified key stakeholders who will ensure the sustainability of the NBS and involved them in the co-design/co-creation process?

Be experimental & reflective

☑ How is experimenting and learning encouraged and failures allowed at different stages of NBS planning, design and/or implementation of the NBS?

☑ How do you facilitate exchange and joint reflection about the NBS with the local population (i.e. working groups, workshops)?

☑ Are there tools in place to monitor, assess and evaluate processes, developments and outputs generated in the LL?

☑ How do you provide a safe space for continuous testing, evaluating and (if required) adjusting of actions, tools and methods?

Be flexible

☑ How are you open to accepting and acting upon changes to objectives, plans, processes, activities and priorities based on changing need?

☑ How do you enable stakeholders to influence activities according to their views and priorities?

☑ How are you open to different working modes of involved stakeholders, changing collaboration arrangements?

☑ How are you prepared to interact and communicate in informal and “unplanned” ways with the stakeholders involved?

4. Tools and instruments for co-design

In general, stakeholder engagement needs to be planned and managed in a systematic way. The following chapters provide some useful tools that can be used to structure the co-design process with detailed, stepwise instructions.

The Vision 2030 helps to identify different perspectives and arrive at a common, agreed vision (chapter 4.1).

The Stakeholder Mapping Tool supports in identifying stakeholders and stakeholder groups in a systematic way that should be engaged in the design and/or implementation of the NBS (chapter 4.2).

The Stakeholder Participation Spectrum allows for clarifying roles and responsibilities of the different stakeholders involved and making ambitions regarding stakeholder involvement explicit. To create a feasible, structured and transparent participation approach, it is important to discuss and agree early on the aim and scope of stakeholder participation. This tool helps you do that by making you differentiate between different types and intensities of stakeholder engagement for the NBS at hand (chapter 4.3).

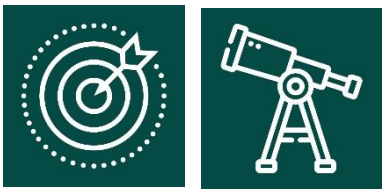
The Participation Planner goes one step further and helps you define type and intensity of the envisaged engagement of each stakeholder group/beneficiaries as well as determine suited engagement formats. This is the base for meaningful engagement of stakeholders in co-design and co-implementation since not every stakeholder might want to be involved in the same way: some groups might only want to stay informed, others might want to get active, again others might want to make sure that the NBS implemented suits their needs and influence where it will be implemented and how it will look like (chapter 4.4).

4.1. Vision 2030

Co-design principles addressed:

Share goals & vision

Think long term



Objective:

Local project partners are diverse and bring different perspectives to the LL. “Vision 2030” is an easy to perform exercise with a small or larger set of key stakeholders (who are then split up in smaller groups). Its objective is to elicit different, possibly diverging perspectives on and expectations towards the desired long-term transformation of an area in which the NBS is to be implemented, and to align them in a jointly created and agreed vision and mission statement.

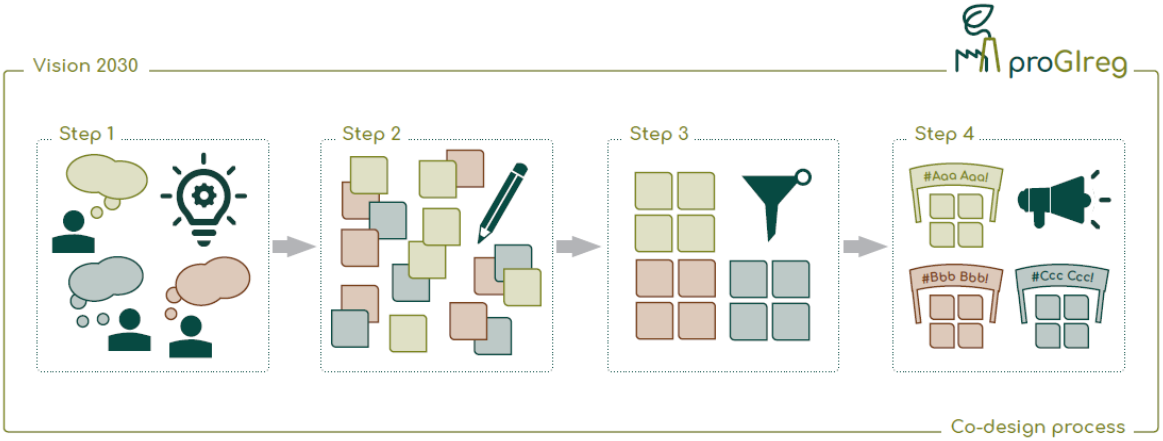


Fig. 17: Vision 2030 – illustration of steps

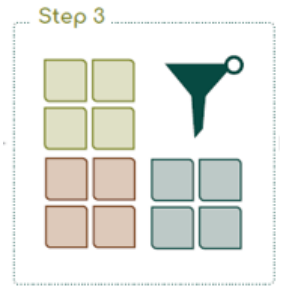
Instructions:

Workshop participants are asked to envision the district/area/neighbourhood approx. ten years after implementation of the NBS in a scenario. They can draw or write down what the area will look like, what activities will be ongoing, what the use/maintenance of the respective NBS will look like, which social and spatial changes will have happened and what inhabitants will think about the changes in the area.

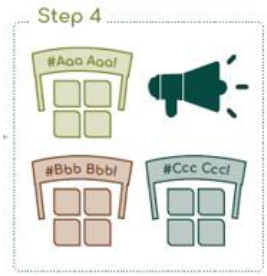
Participants put their thoughts on the imagined state of the district/area/neighbourhood in 2030 on cards and are then asked, one by one, to share with the other participants what they have written down. The moderator picks up the cards and makes a first attempt of clustering them into groups of ‘highlights’.

Table 5. Template Vision 2030

Vision 2030		
Highlight 1		***Slogan / Mission Statement***
Highlight 2		
Highlight 3		
Highlight 4		



In this step, the moderator presents a first clustering attempt and asks participants about their thoughts / whether they agree.



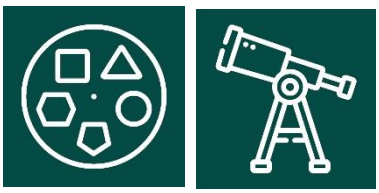
Based on these thematic highlights, participants are requested to develop a one-sentence mission statement/ slogan that best captures what has been discussed.

4.2. Stakeholder Mapping

Co-design principles addressed:

Be open, inclusive & diverse;

think long term



Objective:

This exercise is intended to map the relevant stakeholders coming from different sectors / fields (i.e. research, private sector, municipality) and might need different engagement strategies. Identifying relevant stakeholders to be involved in the co-design and co-implementation process and how different stakeholder groups should participate is essential for a successful engagement. Therefore, relevant stakeholders need to be first identified and mapped. The mapping is recommended to be made according to the criteria of (i) information and resources they bring into the process, (ii) influence – their capacity to affect the issue at hand and pertinent decision-making, (iii) the interest they have in the issue at stake, and (iv) the impact that the issue might have on them[5]. The type, extent and degree of stakeholder engagement in co-design is largely dependent on the type of NBS in question. It is thus feasible to map out stakeholders per NBS and establish realistic expectations of their involvement as early as possible.This exercise has three main goals:

- To **identify** and **map** relevant stakeholders to involve in the local partnerships and work plan, but also in the ongoing work with research partners and stakeholders;
- **To identify** individuals or groups that have an interest in a particular issue, have the potential to affect a decision of policy or are affected by the situation (André et al. 2012) – in our case, stakeholders involved now or later in LL related processes;
- **To gather knowledge**, build trust, create ownership and secure support for your team's objectives.

The exercise is divided into 3 main steps:

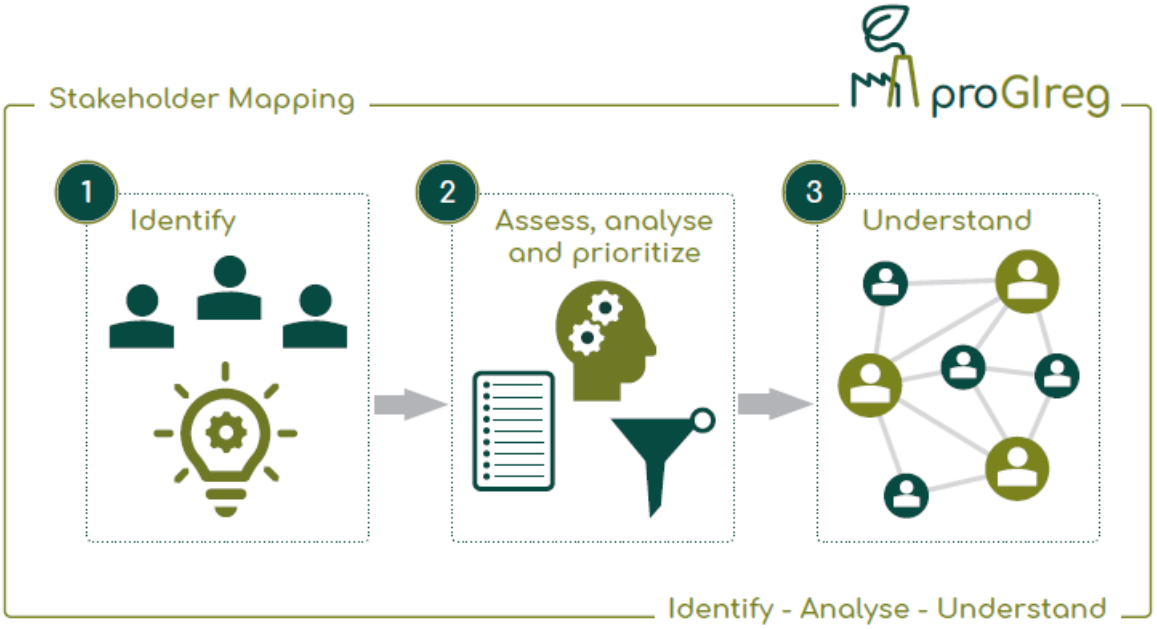


Fig. 18: Stakeholder mapping – illustration of steps

[5] https://ramses-cities.eu/fileadmin/uploads/Deliverables_Uploaded/RAMSES-Handbock-and-Training-Package-final-www.pdf

Instructions:

Identify - During this step the participants need to answer the following questions and subsequently fill out the template (see Table 6):

- → What **information or resources** do you need to address this issue? Who has access to these?
- → Who is responsible for making decisions that might affect this issue? Who else has **influence** to help address this issue? Who is likely to have a negative view of this work?
- → Are there stakeholders that have been involved in similar projects on previous occasions in topics around NBS, health and well-being, green infrastructure etc.? Who else could be **interested** in this issue (i.e. are citizen groups among this group)?
- → Who is (or might in future be) **impacted** by this issue (positively or negatively)?

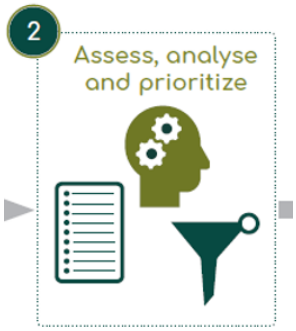
It is useful to map out stakeholders per NBS and establish realistic expectations of their involvement as early as possible. Experience has shown that the type, extent and degree of stakeholder engagement in co-design is largely dependent on the type of NBS in question.

Output: list of stakeholders

Table 6: Template Stakeholder Analysis Table

Adapted from the RAMSES Handbook and Training Package (2017). Available at: **http://www.ramses-cities.eu/fileadmin/uploads/Deliverables_Uploaded/RAMSES-Handbock-and-Training-Package-final-www.pdf**

Activity	*Different stakeholders may be needed depending on the activity and related challenges and objectives. Define your planned activity here, i.e. continuation of NBS implementation at the Living Lab of City of…*					
Sector	***Organization***	***Relationship with municipality*** *(if any)*	***Information*** *(what useful information can they provide?)*	***Influence*** *(what is their capacity to affect the issue?)*	***Interest*** *(why would they want to be involved?)*	***Impacts*** *(how, if at all, are they impacted by the issue?)*



Assess, analyse and prioritize - During this step the participants need to answer to the following questions and subsequently fill out the template (see Fig. 19) placing the stakeholders that they have identified in the previous step in the Interest/Influence matrixWhat level of **interest** is the stakeholder likely to have in the project?

→ What level of **influence** can the stakeholder have on the project?

NB: In this grid, the respective stakeholders' level of interest in the project and their ability to influence the outcomes are assessed.

Output: completed interest-influence matrix

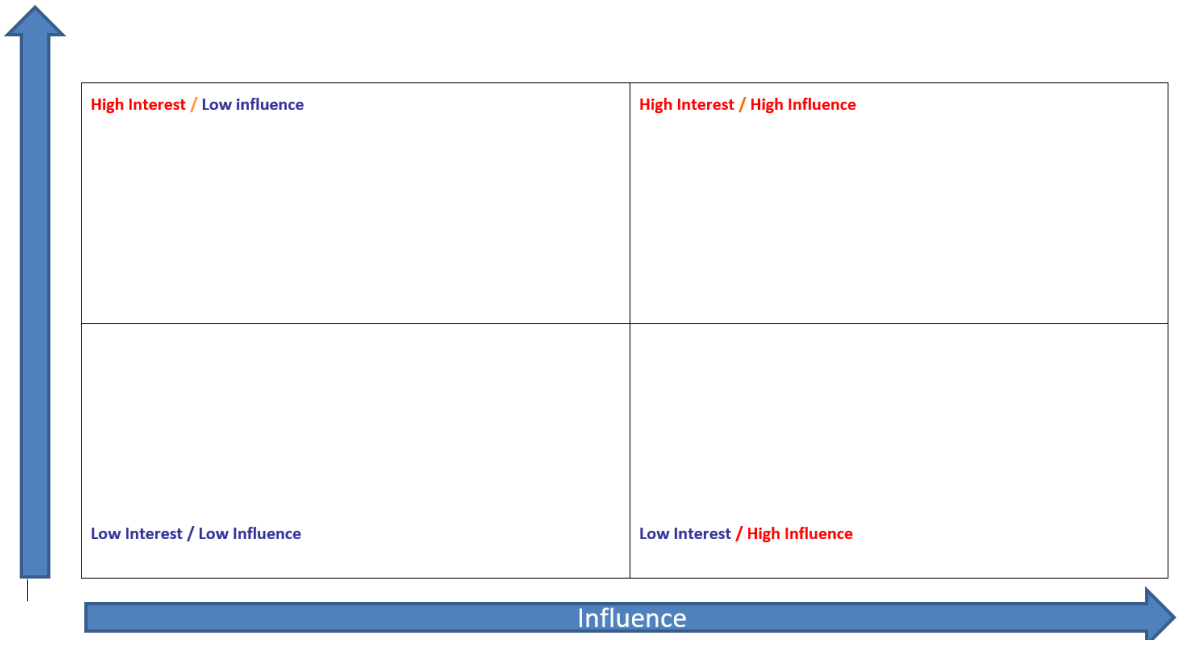
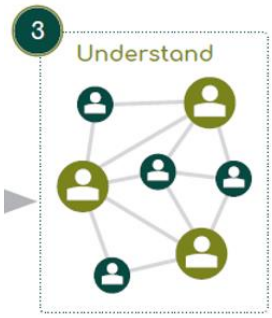


Fig. 19: Template Interest / Influence Matrix. Adapted from the URBACT II Local Support Group Toolkit (2017). Available at: https://urbact.eu/urbact-local-groups



Understand - During this step the participants need to answer to the following questions and subsequently fill out all the columns in the template (see Table 4).

1. What is the stakeholder's relationship with the municipality?
2. What information can they provide?
3. How may they be impacted or affected by the project?
4. How can the stakeholder benefit the project and why?
5. Why would they want to be involved?

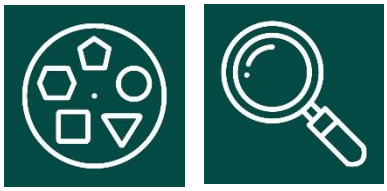
Output: completed analysis table for each planned activity/project

4.3. Stakeholder Participation Spectrum

Co-design principles addressed:

Be open, diverse & inclusive;

be transparent



Objective:

This exercise is based on the so-called „Public Participation Spectrum" (see Table 2 and Table 3) to differentiate **different types and intensities of stakeholder engagement** in urban planning and development, or here more specifically on NBS for urban regeneration (from "consult" to "empower"). The further to the right, the higher the level of engagement and the more influence the engaged stakeholders have on the products and services created (i.e. NBS). At the same time, the role of its initiators decreases from a leading (when stakeholders are only informed and have no means of shaping decisions) to an enabling one (gradually transferring ownership over an NBS to a stakeholder group, followed by respective management schemes). Depending on the context, such as the type of NBS, different degrees of stakeholder involvement might be desired, and boundaries are often blurred.

The stakeholder participation spectrum is a good way to make decisions about the envisaged level of stakeholder involvement explicit. It can clarify the roles and responsibilities of the different stakeholders involved and set the ground for informed discussions and decision-making. It can also help define suited engagement formats and formulate engagement plans (chapter 4.4.). Especially between project partners that have not collaborated before, this exercise can be very useful for making ambitions of the different partners explicit and providing room for discussion, as well as making partners reflect on their own role and position within an initiative.

Instructions:

After being introduced to the spectrum and its various gradients, participants are requested to locate relevant stakeholders they want to engage in the spectrum from 'inform' to 'empower'. A starting point could be the stakeholder groups identified in the stakeholder mapping. Depending on the type of influence/interest and impact assessed for the different stakeholder groups, different levels of involvement and engagement can be envisaged. It is important to state these for each of the stakeholder groups. The participants can then discuss and negotiate the results.

Table 7. Template Stakeholder Participation Spectrum tailored to NBS;
Source Template: Mattijssen, T., et al., The 'green' and 'self' in green self-governance – a study of 264 green space initiatives by citizens. Journal of Environmental Policy & Planning, 2017).

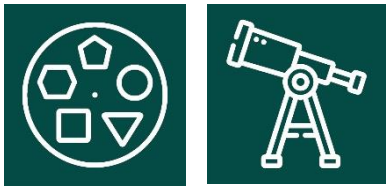
Type of stakeholder participation	Inform	Consult	Involve	Partner	Empower
Description	Providing stakeholders & public with balanced, objective information about NBS projects and plans in order to support them in understanding the problem /solutions; no active citizen engagement.	Consulting stakeholders & public on results of analyses, and alternatives for action as part of decision-making; however, inputs do not have to be considered.	Working directly with stakeholders & public to ensure that their concerns are understood and considered throughout the processes.	True partnering between public authorities and stakeholders in each step of the decision-making to integrate them as much as possible; shared roles & responsibilities around planning & management of NBS.	Placing the final decision into the hands of the stakeholders/public, implementing what they decide (e.g. management agreements, leasing or purchasing of public and private land).
Stakeholder 1					
Stakeholder 2					
Stakeholder 3					

4.4. Participation Planner

Co-design principles addressed:

Be open, diverse & inclusive

Think long term



Objective:

Stakeholder engagement needs to be planned in a systematic way by focusing on the different locations of the NBS, identifying/mapping who should and can be feasibly engaged in the design and/or implementation of the NBS (depending on what is possible in the different locations), and defining tailored engagement formats for each location, NBS and group of stakeholders.

The Participation Planner (developed by CLEVER Cities[6]) is a useful tool to map out existing and planned stakeholder engagement in a Living Lab context. It offers a structured approach for capturing already involved and future stakeholders, and the envisaged type/intensity of involvement (from passive 'recipients' to active co-creators). This allows for identifying all relevant stakeholders, highlighting five levels of potential engagement (inform, consult, involve, partner, and empower) and different methods of engaging with the stakeholders within these levels.

Instructions:

Ideally different sheets are filled in for the different phases of co-creation, namely co-design, co-implementation and co-maintenance. However, this is not strictly necessary since the boundaries between those phases are often blurred. The template below already includes some exemplary stakeholder categories which can be adjusted according to needs.

6. all relevant stakeholders and stakeholder groups shall be inserted and/or adjusted in the first column on the left. Again, the ones identified in the stakeholder mapping can be used as a starting point.

7. the envisaged engagement of each stakeholder/stakeholder group is determined, going through the rows, one after the other. Describe in a few words the purpose of their involvement, what the envisaged involvement implies for the role of the stakeholder and if possible, through which format and means the stakeholder shall be engaged (i.e. workshop, regular bi-lateral meetings, consultation, etc.).

[6] **CLEVER Cities Guidance on Co-creating NBS** (created by Politecnico de Milano)

Table 8. Template Participation Planner

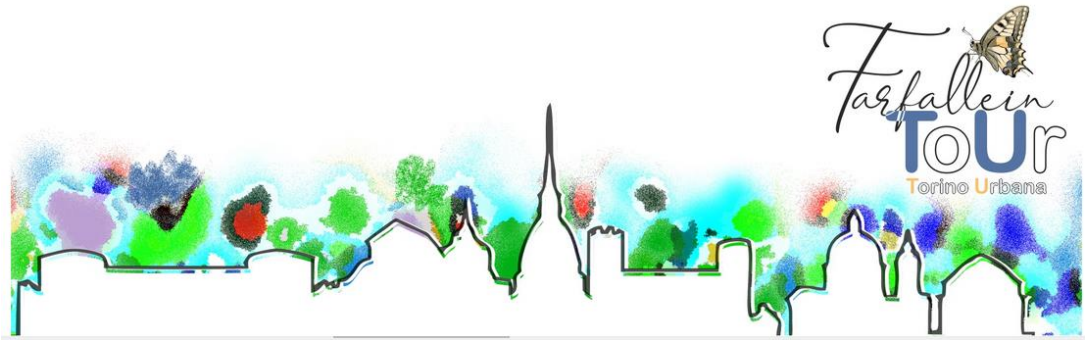
Type of engagement	Inform	Consult	Involve	Partner	Empower
Method of engagement	i.e. Newsletter, Social Media, info campaigns	i.e. consultation	i.e. workshops, topical events, etc.	Active role in the implementation process	Lead role in design and planning of the NBS (decision-making, selection, etc.)
Property/ land owners					
Municipal departments					
Suppliers					
Educational institutions					
Local associations					
Local residents					
Companies					
Others					

5. Stories

Know your target group, their daily routines and needs to find anchor points for their engagement and design activities according to their needs.

In this case, working with educators helped since they know exactly the needs, routines, behaviour and restrictions of people with mental health disorders. For instance, users of HMCs can perfectly understand, acquire and teach scientific knowledge about pollinators, but they experience problems with thinking outside their structure since they are isolated, closed people.

5.1. Story 1 – Citizen Science for monitoring pollinators with mental health patients in Mirafiori Sud, Turin



A typical citizen science project involves citizens volunteering in collecting scientific data under the guidance of researchers. In the case of “Farfalle in ToUr”, the initiative was started by citizens, not scientists. The project was initiated in 2014 by doctors of the Mental Health Centres (HMC) and a group of educators of a Social Cooperative working with users of these centres. It was put in practice together with the Zoolab of the Department of Life Science and Systems Biology of the University of Turin who designed the science component around it.

Users of HMCs often suffer from anxiety disorders, mood disorders, personality disorders, schizophrenia or other psychotic disturbances, such as depression or bipolar disorder. In Italy, there is an established care structure for these patients with therapeutic approaches including medical, social, psychological and educational aspects. Patients spend their days in the HMCs and return to their homes for the night. For such patients, it is favourable to get in touch with people and the world outside these facilities to avoid suffering from isolation which can aggravate their symptoms.

From the doctor’s perspective, two things were crucial. First, not being just another occupational activity, but an active and meaningful contribution to science. Second, that the users of the HMC perceive themselves as part of a network through working in this initiative, not only the gardens of the HMCs, but also in schools and public green spaces.

Long-term thinking is addressed in two ways: 1) long-term monitoring of pollinators which is required for reliable impact assessment of a biodiversity intervention, 2) the need for long-term support of MHPs. 6,900 users of mental health care centres are currently registered, out of which around 30% - according to the estimates of doctors - have disabilities that require long-term support which means they will stay within the structure of the care centres and won’t be leading an independent life. These 30% are potential candidates for the project and thus, at the same time provide a constant and reliable pool of volunteers for long-term monitoring.

sses

From the scientists' perspective, the challenging part of citizen science is to maintain interest of volunteers to safeguard long-term data collection and thus create reliable data. Finding volunteers is easy but fluctuation is high which hampers continuity. Mental health patients are good candidates for long-term monitoring due to a constant lifestyle and set daily routines. Many of them spend most of their lifetime in the HMCs during the day.

The idea for "Farfalle in ToUr" is rooted in two equally important goals: to make butterflies return to the city of Turin by creating so-called Butterflies' Highways; and to allow new relationships between the users of different HMC, as well as between users and citizens.


© Il Margine Cooperative

The project idea is inspired by the metaphor of butterflies undergoing constant change due to their metamorphosis: after months of loneliness and isolation, the caterpillar turns into a butterfly and crosses barriers to reach wildflower meadows and interact with other butterflies. Likewise, taking care of butterflies together makes the patients come out of their social isolation and build relationships. This shall boost their hope and optimism, performing important tasks, and encourage them to take part in a community as active citizen. In the long term this shall help them shape their own identity and live a significant life with paid employment.

At the same time, gardens of different HMC, school gardens and public green are transformed into ecosystems and habitats for pollinators like bees, butterflies and moths. How? By providing the most urgently needed resources for pollinators to thrive in cities, at best close together: foraging sites with nectar-rich flowers or trees and herb-rich areas to feed their larvae, as well as oviposition, resting and hibernating areas. Mental health centers in Turin are usually surrounded by green areas that are so far not cultivated or managed as urban gardens and therefore offer ample opportunities for pollinator-friendly design and management.

Already in 2015, HMCs, belonging to the Local Health Company (LHC), signed a collaboration with the educators of a Social Cooperative, and the Department of Life Science and Systems Biology of the University of Turin who was entrusted with the scientific part. What is new about this project is that mental health patients are actively engaged in the creation of pollinator habitats and the monitoring of butterflies and

This project is diverse with regards to the different perspectives and actors involved: doctors, educators, scientists, mental health patients and students. Both experiences-based and medical knowledge of doctors and educators were the starting point for creating the concept of this project which then drew in scientific knowledge about biodiversity. Knowledge and experience gained from interactions with mental health patients informed the adjustment of training modules for the latter to their needs.

Diversity of actors is not always easy to navigate. When working with users of HMCs in the garden or planning their activities, strict rules have to be adhered to in accordance with their fixed schedules. Educators are familiar with these rules but interaction with academia and nurseries is sometimes difficult. They need to adjust their behaviour and it is a step-by-step learning process. Interaction between mental health patients and children is the easiest since they act most natural with them and do not differentiate based on their handicap.

bees. Some of them teach primary school students about pollinators and engage in educational activities to sensitize students for biodiversity and wider environmental issues.

The educators, together with the doctors, selected 11 candidates to participate in the pilot study. University professors then trained this group in distinguishing common urban butterfly species, pollinator-friendly native and non-native plants, as well as the local food and nectar plants. These skills are necessary for choosing the right plant composition in collaboration with nurseries to ideally include native food plants and nectar sources. The participants perform the monitoring to identify potential increases in populations through direct counting and photographing of butterflies and bees as they need to be able to distinguish different species. The data is then validated by scientists and published on the website www.farfalleintour.it.

© Francesca Martelli

The training concluded with an exam to assess which activities are suitable depending on the individual capabilities and disposition. This is done in a collaborative, individual approach between the researchers, educators and participants. Thanks to proGIreg, small grants support 8 participants who passed the exam. Currently, they are operating in five locations, which are planned to be expanded in 2021. All work is done in collaboration between educators, scientists and participants creating close exchanges. Activities are carefully scheduled and planned in accordance with the users' strict routines.

Through "Butterflies go to school", activities recently extended to students from primary schools. Two participants go outside the centre into schools to teach students and organize educational activities. The aim is to sensitize children about species conservation, through the breeding of *Vanessa cardui* and showing educational documentaries to build their enthusiasm. The programme participants teach them about the life cycle of butterflies and prepare so-called caterpillar houses with soil and important food plants together. Students then observe the development of caterpillars whilst visiting researchers monitor the state of the plants, health of the caterpillars and their general state. When they turn into adults they are released into the wild.

NBS are still relatively new and lack precedence. We cannot apply known processes, and there is also no one-fits-all solution. Instead, we need to keep learning what works and what doesn't.

In this particular case, the university professor had no prior experience about how to collaborate with HMC users. Based on learning by doing, she adjusted training modules to capabilities, behavioural requirements and time tables of the users.

To manage expectations of stakeholders involved in initiatives, the "rules of the game" have to be made clear and explicit at the very beginning.
In this case, the managing association benefits from already established relationships with local residents to build trust in this initiative. Everyone interested can read their objectives and their story on the website, and every plot holder signs terms and conditions they must comply with.

5.2. Story 2 – Vegetable gardens 'Orti generali' in Mirafiori Sud, Turin

The concept of renting out allotments to residents in the Sangone Park emerged during the research project Miraorti (2010 – 2012), which focused on territorial regeneration to steer urban and environmental transformations of the agricultural areas on the banks of river Sangone in the Mirafiori Sud district, city of Turin. The concept of the social enterprise "Orti Generali" creates urban farming space covering 60 percent of the space alongside public space for recreational use (covering 40 percent). Gardeners are able to rent their own plot of land or share a collective one with three or more others to a moderate price.

Changes in the regulation of the city's gardens eased the way for close collaboration with municipal councillors. During the project Miraorti in 2012, the association Coefficiente Clorofilla supported the municipal administration to review the regulation of municipal gardens and proposed a new procedure for assigning urban green areas of 2,500 square metres to associations, which was adopted. In 2016, the municipality expressed interest in Orti Generali and opened a specific call for the concession of the area.

The Municipality of Turin entrusted the association Coefficiente Clorofilla with the management and operation of this area and thus created the base for this public-private partnership. Three employees design educational, social and communication activities. Whilst the association Coefficiente Clorofilla acts as the project manager, the management of Orti Generali is in practice divided between them and the volunteers and social gardeners who are regularly participating in meetings to discuss, organise and plan the work. The association has established links with the local community and other local associations: collaboration between Fondazione Mirafiori, the overarching association of the district, cooperatives working with disadvantaged people, the local health authorities, the department of chemistry, biology and agriculture of the University of Turin and the municipality of Turin. The latter is an important mediator concerning the department for urban green (for new projects in the area) and the City Calls Officer as support for funding. The municipality of Turin benefits from the value of the initiative for the district whilst not having to cover the maintenance costs of the park.

Long-term thinking is often considered a challenge given short political cycles.

In this case efforts were dedicated to building long-term relationships with municipal councillors of Turin well ahead of the project. These efforts gave rise to a window of opportunity which made the changes to existing municipal garden regulations possible to facilitate and consolidate the management arrangement underlying this initiative. It is imperative to think beyond project objectives to work towards policy change in the future.

Make use of intermediaries and bridge-building organisations to reach certain groups that benefit from the NBS.

Think of formalising collaboration agreements with NGOs or civil society organisations that operate in the district with good access to the local residents and the community. They can be important focal and access points to smaller associations and initiatives in the district.

citizens. During the project Miraorti, the association, together with two entities also active in the area, conducted interviews with students, families and senior citizens of the district of Mirafiori. The results of the interviews showed the need for outdoor activities and access to healthy food, also potential interested parties for urban agriculture activities were already identified. In February 2019, residents of the Mirafiori Sud district defined the objectives of the initiative along with the concept during focus groups. Their joint vision is creating a more socially inclusive and community-driven neighbourhood by enabling citizens to grow their own food.

Motivations to participate in Orti Generali are as varied as the user groups.

- Citizens decide to become urban gardeners for the possibility to spend time outdoors in contact with nature with relatively little effort (due to automatic irrigation), but also for exchanging with new people and for the community-focused vision of this initiative.
- Local associations and cooperatives with whom Coefficiente Clorofilla actively collaborates, find in Orti Generali a place where disadvantaged people benefit from horticultural activities and the interaction with farmyard animals. People with physical disability work in the seedbed, people with drug addiction problems work in the collective garden with volunteers, one young group of disadvantage people operate their own garden and for others, work grants are frequently obtained.
- Gardeners and horticulturists who have been illegally occupying land plots in that area and form an integral part to the neighbourhood's identity have only been waiting for support in reclaiming the area.

Indeed, diversity of plot holders is actively promoted by the association in order to break with established socio-economic and demographic patterns. A certain amount of allotments is reserved for young people below the age of 35 and there is a range of rental fees to accommodate different income groups. Plot holders that have not been previously present in the area are actively involved in transformation processes for instance through events to create a well-integrated community despite its heterogeneity. The formerly illegal horticulturists are also an important target group.

Engage stakeholders early on in the process to create a sense of ownership for the NBS and increase the chance of their maintenance and caretaking beyond termination of a pilot project.

In this case it was imperative to get the previous users of the area on board. Building relationships with them right from the start through continuous exchange of knowledge and experience allowed the local partners to get an understanding of their needs and design a system conducive to their daily realities.

Not only were they actively engaged in redeveloping the space, but they also receive plots in the gardening area for a symbolic fee (social tariff of EUR 5) and in exchange for maintaining common areas, following the concept of a time bank. This ensures the historical continuity of the projects in the area.

However, creating a real community between the different groups of gardeners, encouraging relationships and organizing events with many participants is a challenge. Designing common areas for exchange and leisure has helped meet this challenge. Also, responding to the needs and requests of the different gardeners is difficult. Continuously asking plot holders for positive and negative feedback and empowering people to take care of the space and perform specific tasks has helped. Further, progressively adding new services and activities allows Orti Generali to meet diverse interests and expectations as well as attracting diverse plot holders. Local partners are currently creating an educational and training centre on urban agriculture and environmental sustainability along with a calendar of activities. Also, the provision of food and beverage services through a kiosk is planned for the community of gardeners, to ensure a continuous presence in the park and rebrand green areas in the outskirts of the city.

Valuable feedback is also provided by the University of Turin, as an important collaboration partner in research. It continuously assesses and analyses the social, environmental and economic impact of the project in the district and in the wider metropolitan city.

Experimentation and continuous learning take centre stage in this initiative. Catering spaces to the needs of different actors and building a real community of users is an ongoing learning process which is continuously informed by feedback from the users. The association experiments with new offers and activities and is also prepared to fail.

Inclusiveness lies at the core of this initiative, targeting people who suffer from physical or mental health issues as main users.

Through partnering with experts like the organisation Mali Dom and community residences for grown-ups with autism, and by having face-to-face meetings and active correspondence with future users, it was made sure that the garden is planned in a way to fulfil users' needs and requirements.

5.3. Story 3 – Therapy garden in Sesvete, Zagreb

Zagreb's Living Lab is located in the district of Sesvete, which has a large share of young, dynamic population and is thus considered one of the city's most promising districts. For almost a decade, when derelict areas were opened up to the public for interim use, so-called "city gardens" for urban farming on small parcels have flourished. Due to an increasing interest of vulnerable and disadvantaged groups, the City of Zagreb devised a plan for a new kind of garden equipped for people with psychological and physical disabilities: a therapy garden. The existing and ongoing project of city gardens provided a solid base for the planning of the therapeutic garden. The idea was brought up by the Head of Department of Agricultural Land in the City Office of Agriculture, who did her postgraduate studies on the topic of therapeutic gardens.

Therapy gardens are specially designed gardens with elements such as accessible pathways, raised beds and sensory areas for adults and children with a range of physical disabilities, learning difficulties or mental health challenges. They aim to strengthen their motor, sensory, cognitive, affective, nutritional, emotional and social potential. In the long run they can help promote social equality of disadvantaged groups and reduce discrimination and prejudice based on disabilities.

A large therapeutic garden for autistic children is already planned in Borovje (currently being put on hold due to the earthquake in March 2020), a neighbourhood in the Southeast of Zagreb. It will be managed by the organisation Mali Dom that mainly works with visually impaired children, children with autism and other disabilities. The organisation became an important partner in the planned, smaller initiative early on which aims to learn from its "bigger brother".

The initiative will be operated by Mali Dom while the management lies with the Office of Agriculture and Forestry. The Strategic Planning Office of the City of Zagreb is the overall coordinator of the initiative. As a strategic partner, Mali Dom provides both expertise on appropriate design of such a garden based on user needs and acts as a bridge between local contacts and future users. Target groups are citizens residing in the area in general, as well as those citizens with family members with a disability. The latter are mostly reached through intermediary NGOs, such as the Muscle

Identifying the benefits of an NBS for the target group and making them visible and valued is crucial but at times difficult.

The therapy garden has a distinct target group which makes it easy to communicate the benefits accrued to this target group. At the same time this secures its future users who, since they are the main beneficiaries of this initiative might be more willing to invest in its maintenance.

To **satisfy all potential users' needs and requirements**, whilst complying with the spatial and financial frame, the design of the therapeutic garden had to be carefully planned and programmed. The programme was drawn up following the meetings and after recommendations from experts, since the first proposal focused solely on children with autism and failed to provide raised garden beds in sufficient quantity.

Distrofy Organisation, who are actively included in the co-design process. The Strategic Planning Office got in touch with the City Office for Social Care which provided a list of addresses of locally based NGOs and communal housing units for people with autism. The latter were then actively contacted and invited to the meetings and workshops.

The general public will be engaged through the local civil society NGO ZIPS who are experienced in stakeholder engagement and know the area and its residents well. They are the link between the citizens and the municipality. The therapy garden builds on already established inclusion activities as well as the social strength of the local community.

The co-design mostly took shape through regular face-to-face meetings and workshops that were organized by the project team (core group) with the above-mentioned stakeholders and users and will be continued. That way, the content and elements of the garden were decided in a collaborative manner. To provide some flexibility, the garden will allow construction in stages. It will start with the basic design with minimum resources, and later on additions will be made. Once the garden approaches the implementation phase, a wider set of stakeholders will be included.

Especially when working with disadvantaged groups**, transparency is key to gaining trust, one of the most important assets in the management of such an initiative**. This trust was won by engaging the users and intermediary NGOs directly and from the start in the co-design process and letting them shape the design and program of the garden.

Long term planning is crucial for the sustainability of the activities planned. In that initiative long term thinking is addressed in the design and envisaged management of the garden which allows for adding on elements in the future, to be funded by other resources. In the face of the COVID-19 crisis, local supply chains and relationships will experience a revival, which could make Sesvete a model community to learn from.

The nature of co-design requires openness of stakeholders and embracing uncertainty with regards to content and outcome of actions which are only being developed in the co-design process. This is often a challenge.

The executive committee of the church community was very open to the process and made only very few specifications for the planning of the activities. Their only concern was that the needs of the users of the area are met. Thus, the initiative benefitted from a rather unbureaucratic process which allowed for flexibility in decision-making, timing and design of the activities.

5.4. Story 4 – Pollinator-friendly food forest on church grounds in the district of Huckarde, Dortmund

The Urbanisten are a not-for-profit organization operating in Dortmund as initiator and implementor of citizen engagement and participation projects in public spaces. In proGIreg they are the local partner representing civil society.

The Urbanisten supported a campaign of the local scouts and built several raised beds for vegetables and herbs on a piece of cleared land owned by the Catholic Church of St.Urbanus, namely the garden of the church parish hall in the district of different ages joined action to build raised beds with pollinator-friendly plant mixes. Also, nesting aids for wild bees and seed bombs were created.

This has given rise to the co-design and co-implementation of a food forest together with the local scouts group. In the exact same spot, the Urbanisten will organize a series of workshops over the year 2020 in which the scouts will explore in a playful manner which plants could fit into the different sections of the food forest, select plants that are pollinator friendly, sow and grow them. Such a food forest is easy to handle since it can be left alone for periods of time and is conceptualized in a way that the plants support each other.

Part of the food forest concept is to regularly evaluate what works and what doesn't and to adjust further planning.

The goal is to create more social interaction between the citizens in the area and to create an offer that is open for all age groups to deliver a wide range of benefits for the residents.

Since the executive committee of the church community is responsible for the area, the pastor of St. Urbanus was approached to contribute his ideas for the area. Afterwards, the Urbanisten started an open dialogue with the scouts about their wishes for the area and to draw their ideas on a map of the plot. Based on this, the Urbanisten developed a concept with an expert for forest gardens and permaculture. This concept was presented to the public and the scouts at an information event which was promoted via the networks of the association, their website as well as the networks of the pastor of the St. Urbanus parish. The plot will be freely accessible for all interested stakeholders including schools, nurseries and co-working groups shall get involved.

The engagement format of workshops with the community and the local scouts was chosen intentionally to ensure that participants identify themselves with the result and support the further construction of the food forest. The workshop series is designed that the participants can continuously determine decisions and actions through discussion. That way people should be empowered to care for and maintain the garden in the long run. It is envisioned that they take over sponsorships of parts of the food forest.

The close collaboration and engagement with the scouts from the very start gave rise to a shared goal and vision which is strongly rooted in the wishes of the local community: to do something for environmental protection and to be able to harvest fruits and vegetables on site.

In a series of workshops in 2020, the Urbanisten will provide targeted input on various forest garden topics and enable its implementation.

The successful implementation of this initiative on 3,000 square metres is largely owed to the alignment of interests between the project partners and the local pastor and to fortunate circumstances. On the one hand, the garden has been the centre of activities for the local scouts group for quite some time. It was their desire to make it a pollinator-friendly space and work with raised beds. On the other hand, the local pastor has a vital interest in reviving the parish hall garden with citizen-led activities. These perspectives aligned with the vision of the Urbanisten to transform the space into a recreational area with educational elements about permaculture and pollinators.


© Nils Rehkop, the Urbanisten

Alignment of interests between land owners and co-design stakeholders

A window of opportunity presented itself where interests of the stakeholders involved were aligned well. The Urbanisten had permission to use the space without having to follow any administrative procedures, such as signing a lease contract. However, finding spaces for the implementation of NBS has been challenging in Dortmund. Especially in light of very limited availability of publicly owned space which made the local stakeholders enter in lengthy negotiations about lease contracts with private land and property owners.

Part 3

6. A reality check on co-design and lessons learnt

The following chapter contains reflections on lessons learnt from the co-design processes in the three European FRC, covering the following key topics:

1) the FRC's different ways of navigating and putting in place roles, responsibilities and pertinent governance arrangements for co-designing urban NBS as represented in the European FRC's initiatives introduced in chapter 5;

2) The FRC's different approaches to engaging marginalised groups and lessons learnt;

3) A reality check on the concept and implications of co-design with regards to intensity and extent of stakeholder engagement possible, which results in the identification and elaboration on parameters that were found to determine the timing and intensity of co-design.

6.1. Revisiting roles and responsibilities for co-designing NBS in urban regeneration processes

Increasing public sectors and citizen engagement in planning processes goes hand in hand with a shift in roles of public planning authorities. Boundaries have blurred regarding the extent to which governments carry responsibility and to which they are the sole producers of public services (Breukers & Jeuken, 2017). However, how much are urban systems really prepared to make and accept this shift in roles? In addition, where are potential bottlenecks and frictions?

In proGIreg, the starting point for co-design and co-implementation was a multi-stakeholder arrangement in the Living Labs, established by the quadruple helix partnership of the local partners (see Fig. 2). This arrangement integrates academia and research institutions, local government representatives (municipality), the private sector and industry (SME implementing the NBS and entrepreneurs), and NGOs as a civil society representative. This multi-stakeholder partnership has been – as part of the co-design process - extended by additional stakeholders (i.e. other municipal departments, foundations and cooperatives active in the Living Lab area, school administrations, public institutions, real estate companies, landowners, property managers, and so on).

ICLEI's approach to steering and escorting the co-design process in the three cities included:

- assigning one contact person or 'escort' per FRC of the project team who acted as the main responsible person for conducting three co-design workshops in 'her' or 'his' city.
- taking the role of a neutral, impartial moderator, facilitator and sometimes, mediator. Instating a neutral arbiter is highly recommended for several reasons:

- → adding credibility and trust to the process;
- → bringing together diverging opinions and perspectives;
- → mediating if required to avoid lock-in and ensuring everyone is on the same page and bring together ideas in a coherent strand and structured manner;
- → safeguarding impartiality – such a role should be taken over by an external actor, not partners directly involved. This could be a consultant or someone from an organization experienced in moderating processes and knowledgeable about the project area.

Taking the example of the ongoing project NATURVATION (see Fig. 20), NBS led by the municipality are the most frequent type of governance ("inform", "consult"), whilst NBS jointly implemented by governmental and non-governmental actors are increasingly emerging (Kiss, Sekulova, & Kotsila, 2019). NBS types such as green districts, parks, forests, urban trees and green corridors appear to be more prone to be government-led that typically municipalities are in charge of. NBS types such as community gardens or pollinator-oriented initiatives are mostly managed by non-governmental actors (see Fig. 20).

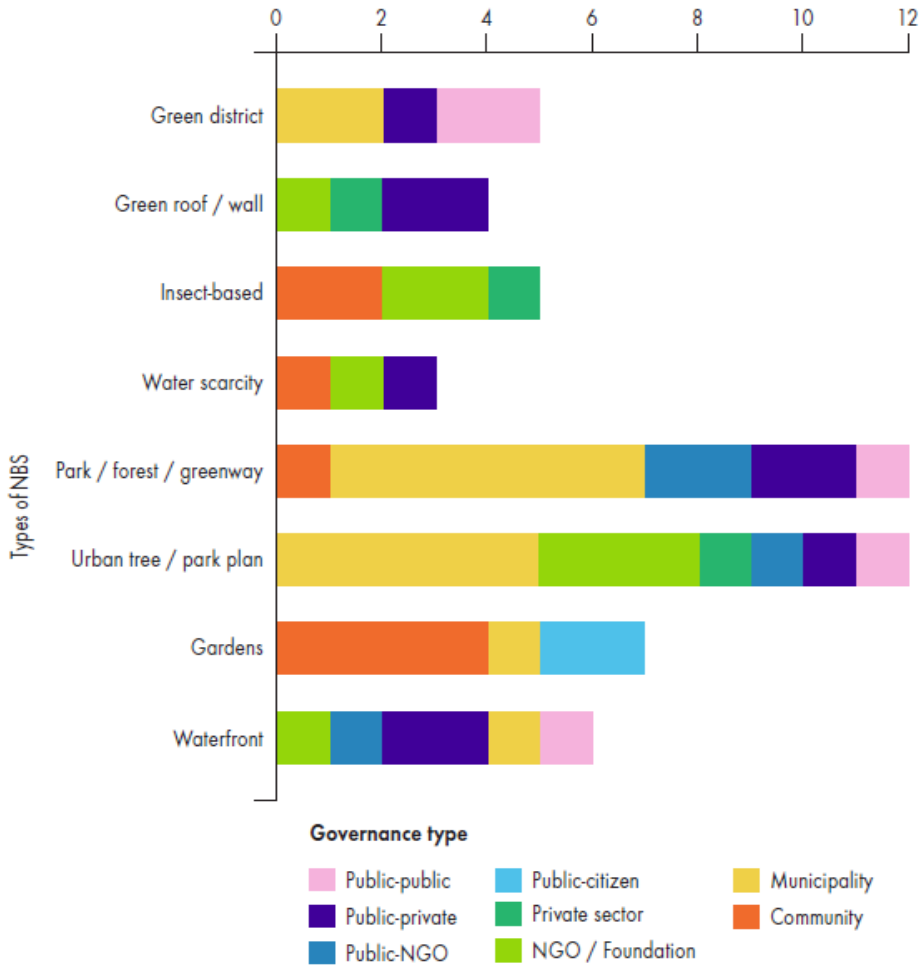


Fig. 20: Governance types per types of NBS (Source: Kiss, Sekulova & Kotsila, 2019).

Some municipality-led NBS follow established planning approaches and procedures allowing public consultation at given moments, but offer limited leeway for co-design both in terms of timing and intensity of engagement.

NBS implemented in proGIreg cover a wide spectrum of governance and management constellations (see Table 2), including traditional public administration, public-public partnerships and public-private partnerships.

The public-private partnership in Turin's community-driven vegetable garden "Orti generali" is an example of a collaboration between municipal and non-municipal actors where public officials are not leading. Instead, they consult and support private actors with regards to planning and administrative processes and make links with other municipal departments when needed (i.e. for planning application, soil samples, available public space). The operation and management of an NBS is outsourced to a private actor, such as an NGO already active in the area. Municipal actors entrust NGOs, associations or private actors with the management and operation of the respective NBS, often on public space (see Table 10, Annex 2). This should be supported by a policy framework or administrative procedure that enables private actors to sign lease contracts for public (green) spaces of a certain size. "Orti generali" are co-managed by the association, volunteers and social gardeners who are periodically involved in public meetings to discuss, organize and plan the work.

A similar public-private governance arrangement is envisaged for the planned Zagreb Therapy Garden (chapter 5.3.). The municipality of Zagreb has a more prominent role as overall coordinator of the initiative (i.e. the Strategic Planning Department) and in overseeing the management of the future therapy garden (i.e. Office of Agriculture and Forestry) (see Table 11, Annex 2). Similar to "Orti generali" an NGO is entrusted by the municipal actors with the operation of the NBS. At the same time this NGO serves as an intermediary partner between the local contacts and the future users of the garden, together with other local NGOs that work with different types of marginalised groups who are potential future users. Another important partner is a local NGO named Green-Blue Sesvete (ZIPS) with vast experience on the ground regarding citizen engagement. It is the strategic link between the municipality and citizens. The management structure for the therapeutic garden still needs to be set up by the Office of Agriculture and Forestry, together with the operating NGO. The former will also be in charge of providing the needed materials/supplies. Several pertinent local NGOs working with the targeted marginalised groups act as strategic partners and bridging organisations.

"Farfalle in ToUr" in Turin (chapter 5.1.) represents an interactive governance type where several public (universities) and private stakeholders (Local Health Company; users of Mental Health Centres) are involved in the design and implementation of the NBS (in this case with hardly any municipal actor involvement) and perform largely equal roles. Here, the department of Life Science and Systems Biology of the University of Turin is taking a lead role in the design and implementation of the initiative, together with the users of the Mental Health Centres as main implementors of the initiative. Formal partners are the Mental Health Centres and the educators of the social cooperatives with whom all activities are coordinated (see Table 12, Annex 2).

Self-governance arrangements are characterized by the private sector or community organisations taking the lead while the public sector takes a supporting, responsive role. Such

an arrangement is observed in the community / privately driven permaculture initiative in Dortmund which was initiated and steered by the local NGO the Urbanisten, together with the local church as partner (chapter 5.4). Whilst the local NGO who has a strong expertise in community engagement, is coordinating and facilitating processes and activities, citizens designed the concept and plan according to their priorities and decided on the type of activity on the plot. In this arrangement, citizens are perceived as equal partners in planning and power relations are well balanced between the actors (see Table 13, Annex 2). Thus, a high intensity of engagement can be achieved. Informal settings such as the ones found in this example provide room for needed flexibility in iterative, non-linear co-design processes that juxtapose conventional linear planning processes of established procedures.

6.2. Approaches and lessons learnt from engaging marginalised groups

Following the project's special focus on marginalised groups, the majority of the stories in chapter 5 focused on initiatives including and engaging marginalized groups to make them an integral part of the NBS. This was done following two main approaches:

- Create a dedicated NBS/activity as a response to their needs and interests, such as the creation and monitoring of pollinator-friendly green spaces by people with mental health issues (chapter 5.1) or the therapy garden (chapter 5.3);
- Carve out tailored roles and activities in alignment with the groups' requirements and interests (chapter 5.2). For instance, people with physical disabilities working in the seed beds, people with drug addiction working with volunteers in a collective garden, or previously illegal horticulturalists maintaining common areas in exchange for receiving a private allotment in the vegetable gardens.

It needs to be seen whether all pertinent initiatives in the European FRC deliver on the objectives to lower barriers towards more equal participation in civil society and community activities, as well as the integration of marginalised groups into social life. However, the ones already implemented seem to be on track. For instance, in Turin's "Farfalle in ToUr", mental health patients are given important responsibilities and encouraged to partake in a community as active citizens through creating and monitoring pollinator-friendly habitats.

Key findings from all stories include:

- **the use of representative and suitable intermediaries or bridge-building organisations** already working with particular marginalised groups or representing them prove crucial in reaching out to them and win their trust. These organisations can serve as important access points with ample experience-based information about the target group, their requirements and interests and can thus help shape NBS in a manner to accommodate these requirements and interests, if consulted early on in the process.

The approaches vary by FRC. In Turin, the idea for NBS - creation and monitoring of pollinator-friendly green spaces - by persons with mental health issues to support their integration into society (chapter 5.1), was put forward by intermediaries. In this case, both the intermediaries as well as the target group itself actively shape activities according to their requirements.

Zagreb's Therapy Garden is another example of creating a dedicated NBS/activity for people who suffer from physical or mental health issues as main users. The strategic partnership with the bridging organisations Mali Dom, which works with visually impaired children, children with autism and other disabilities, provided the expertise on appropriate design of such a garden based on user needs and acts as a bridge to future users. Also, contacts to locally based NGOs and communal residences for grown-ups provided by the City Office for Social Care were harnessed to reach out to future users. Most importantly, the future users trust was won by engaging them and intermediary NGOs directly and from the start in the co-design process through face-to-face meetings and letting them shape the design and program of the garden.

- **framing NBS along the needs and interests of the particular group and their daily routines** ensures the support of marginalised groups and citizens in general,

For instance, refugees often have a close connection with agricultural activities, whereas social housing residents might want to profit from subsistence benefits provided by the community gardens' produce. In "Orti generali" in Turin, (chapter 5.2) horticulturalists that had been illegally occupying land plots in the area were waiting for the momentum and support legally reclaiming the area, which Orti Generali made possible.

- **communicating the value of a particular measure concrete as possible** by using simple language, visuals and translation services as needed.

An interesting lesson learned from Turin was including co-design – or co-creation more generally – as a requirement in tenders to ensure that the voice of local populations (and especially those marginalised) is heard and they can influence local developments.

Finally, for future endeavours it would be important to answer the following two questions prior to embarking on co-design in order to clarify and then develop details of involving relevant groups by gauging their particular interests in the NBS application, ways and means to engage them most effectively etc.:

→ For which NBS is it essential to 'shape the design' together with marginalised groups?
→ In which cases can marginalised groups have a tangible impact on the final design of an NBS?

6.3. How much co-design is possible and feasible?

Intensity and extent of co-design (from "consult" to "empower") tends to be partly dependent on the type of NBS. Some NBS lend themselves more to stakeholder engagement than others.

For instance, urban farming initiatives with their direct, immediate benefits can easily attract contributors and allow for early engagement. In contrast, an extensive green roof relies on expert knowledge for implementation and therefore limits the possibility of co-design through the public from the start and/or discourages residents from participating in the first place. Another issue to be considered is the limited accessibility of green roofs for the public apart from the building's residents.In addition, we need to gain more experience at which stage of the planning process co-designing different NBS types can possibly start and how it can be

navigated. Ideally, co-design already starts with a co-diagnosis or co-selecting a space for the intervention. However, for process-related and organizational reasons this is not always possible.

For any city/party wanting to replicate co-design/co-creation, it is key to identify parameters which might positively or negatively impact the co-design process, which not only creates awareness for the framework conditions in which the NBS is operating, but also helps to make informed decisions early on. Cross-checking the type of NBS to be designed and implemented against these parameters in the planning phase allows for assessing the timing of the process and the potential intensity of stakeholder engagement. Potential limits to co-design can thus be communicated transparently early on to interested stakeholder groups and expectations managed. Table 13 illustrates the parameters that were identified as crucial in influencing co-design processes in proGIreg's European FRC. The list is not exhaustive, but a starting point. It outlines the respective parameter, describes the issue and its relevance to co-design, and elaborates on the potential implications it might have for the timing and intensity of the co-design process. Four such parameters were identified (see Table 9):

Table 9. Parameters affecting timing and intensity of co-design

Parameter	Issue	Relevance to co-design	Implication for timing & intensity of co-design
Type of NBS	Does your type of NBS allow for co-design?	Due to their nature and the benefits they deliver, some types of NBS might garner more public support than others (i.e. urban farming). Others require technical expertise for design, implementation and maintenance (i.e. green roof, aquaponics, new soil).	Not all NBS are conducive to co-creation already from the stage of co-design and/or co-design that aims at a high intensity of stakeholder engagement (from involve to empower).
Location of NBS & Landowner requirements	Public space (owner)	Co-design usually happens after choosing a location in order not to risk disappointment that could hamper stakeholder buy-in.	Public spaces/owners are the preferred option since they can make lease contracts easier for you, tailor them to your needs or change administrative procedures if required. They also give you more flexibility for co-design.
	Private space (owner)	Co-design requires the acceptance of uncertainty to keep options of uses and outcomes open (NBS are supposed to be co-designed together).	Lengthy negotiations with private landowners with a draft concept might lead to potential delays and limitations in co-design. Decisions for a particular type of NBS and process might

			have to be taken early on, counteracting the idea of co-design. There might also be a lack of interest in NBS on behalf of the land-owner which can prolong the search for a suited location.
Land-use requirements	Is allocated land use in line with envisaged use (i.e. commercial, recreational, etc.)?	Uncertainty regarding land use can stall the co-design process since you need to be cautious with communication and expectation management.	If land use is not in line with the envisaged use, you might have to search for another location, unless the master plan is currently being updated and offers a window of opportunity to change the allocated land use.
Construction, safety-, access regulations and standards	Does your NBS comply with construction, safety and access regulations and standards? Which permits do you require for the NBS to be implemented and operable?	Compliance with planning procedures, safety regulations should be checked early on since it can stall or even prevent implementation of an NBS (i.e. green roof, new soil etc.). Unknown requirements might arise that have not been planned for; application processes can be lengthy and require resources.	If the envisaged NBS do not comply with regulations, the concept will have to be adjusted or another location found for the NBS which can delay the co-design process. Also, accessibility by the public might be impacted by regulations which can affect the co-design process.

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Glossary

Nature-based solutions

Nature-based solutions use natural elements or processes to address societal and environmental challenges. For example, in inner-city areas with little green space available, green walls and roofs are added to buildings to improve their insulation, filter pollutants, provide food for pollinators, and make the space more pleasant for people to live in. The proGIreg NBS are specifically adapted to the needs of post-industrial areas. For example, aquaponics - the soil-less cultivation of plants and fish whereby the fish waste water provides the nutrients needed to feed the plants - enables communities to produce their own food in areas where traditional vegetable gardening would otherwise not be possible, such as in areas where soil is contaminated.

The European Commission defines "*nature-based solutions to societal challenges as solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource efficient and systemic interventions. Hence, nature-based solutions must benefit biodiversity and support the delivery of a range of ecosystem services."*

Source: **https://ec.europa.eu/research/environment/index.cfm?pg=nbs**

Green Infrastructure or nature-based solutions?

Green Infrastructure and nature-based solutions share that they are both deliberate interventions and/or a result of strategic planning. In some cases, the concepts overlap. For example, community urban gardens could be planned as a nature-based solution, addressing social, environmental and economic challenges, by enabling local residents to spend more time in nature, grow their own healthy food and bond with their neighbours. If the gardens are also planned as a node or corridor within a larger green space system, they can also be considered part of the Green Infrastructure of the area.

Living Labs

The specific areas or neighbourhoods, where social, economic and technological ideas and concepts are developed and tested in real-life settings. In proGIreg, they are co-created within a **quadruple helix model** (including citizens, local governments, businesses and research and academia), and integrate research and innovation processes, exploration, experimentation and evaluation. The intention is to transfer the acquired knowledge from the Living Labs for use in other locations.

The proGIreg Living Labs involve user communities, not only as observed objects but also as active participants of co-creation. The four LL in **Dortmund**, **Turin**, **Zagreb** and **Ningbo, China** are – to varying degrees - former industrial areas that are struggling with the decline of production and related job losses . Within each LL, various **nature-based solutions** are being

implemented to stimulate new economic activities, while regenerating ecological conditions and supporting societal and community cohesion.

Co-creation

The systematic involvement of all relevant stakeholders from the start to the end of a project (and beyond, in the case of proGIreg), in order to achieve mutually valued outcomes. ProGIreg, aims at involving citizens and civil society, government, the private sector, and research and academia (see **quadruple helix approach**) in participatory, trans-disciplinary and multi-stakeholder processes for the co-design, co-development, co-implementation and co-evaluation of **nature-based solutions**. Together with the active engagement of disadvantaged social groups (e.g. social housing inhabitants, refugees or disabled people), this approach aims to enhance stakeholder and citizen ownership of the nature-based solutions created.

Quadruple helix approach

Within proGIreg, **nature-based solutions** are co-created in multi-stakeholder partnerships. The quadruple helix approach represents the core team in each **Living Lab** consisting of four key stakeholder groups: civil society (NGOs and individual citizens), academia (universities and research institutions), governmental institutions (local governments and other public authorities) and the private sector.

Through this approach, proGIreg ensures that the innovative nature-based solutions developed, are based on reliable scientific evidence, can be implemented within legal frameworks and government mandates, and are economically feasible and adapted to the needs of people. Within proGIreg, the intention is to apply the quadruple helix approach at all levels of research, design, implementation and assessment and in all local partnerships.

Annexes

Annex 1: Introducing proGIreg's NBS and Living Labs in Dortmund, Turin and Zagreb

Dortmund

NBS 1: Renaturing land fill sites for leisure use and clean energy production

Dortmund's LL area runs along the Emscher river next to the Huckarde district, stretching from the West of the city centre to the former coking plant Hansa and the former Deusenberg landfill site in the North

Since the installation of sport devices on the landfill proved to be unfeasible within proGIreg's lifetime, alternatives are being explored which involve moving the sports infrastructure further into the Huckarde neighbourhood that has become the LL's centre. Activities are planned to be integrated with urban farming and biodiversity actions in the neighbourhood.

NBS 3: Community-based urban farms and gardens

NBS 8: Pollinator biodiversity improvement and citizen science

The combination of urban gardening with pollinator-friendly seedlings and plants creates important habitat networks across the LL involving multiple stakeholders. Amongst several locations, the local NGO Urbanisten, together with local scouts, are co-designing and co-implementing urban farms and gardens on a piece of cleared land owned by the St. Urbanus Catholic Church. This includes the co-selection of pollinator-friendly plants for a food forest and raised-bed gardens. Another location is a public park next to a district school where students and teachers are already actively maintaining a demo aquaponics system and will implement an urban garden together with the Urbanisten. Also, pollinator-friendly flower strips will be grown on the Deusenberg.

NBS 4: Aquaponics

Aquaponics will be installed at the Hansa Coking Plant consisting of two greenhouses; one as a demonstrator and one for conducting tests to increase the technology readiness level of the system. Plans exist to test a lease model for renting floating rafts on top of the aquaponics to the local population for growing plants and flowers (community-based business model).

NBS 6: Making river corridors accessible

A new path will be created between the Huckarde neighbourhood and the landfill. It involves the expansion of an already trodden path, providing a West-East connection to the Deusenberg landfill. A private company (contract signed) is currently conducting a feasibility study and will present its findings early 2020.

Fig. 21: Dortmund's Living Lab area – Living Lab Vision Map.

Turin

NBS 2: New regerenated soil

Local authorities in Turin have identified the need for additional arable soil for new green spaces and have decided to use the Sangone Park for producing and testing regenerated soil. This soil is ideal for urban forestry and the aim is to make the regenerated soil available for use in public green spaces throughout the city. A new soil pilot was launched in November 2019 with a preparatory meeting held with gardeners on 5th November to explain what will be done, explore how the new soil could be used in gardens, and to start the training activities. Courses and lessons on new soil chemistry will also be offered to high school students.

NBS 3: Community-based urban farms and gardens

Abandoned parts of the Sangone Park are redesigned and used for community urban gardens. The aim is to improve the safety of the area and encourage community activities and productivity. In the Piemonte Park, 2.5 hectares of land are used for social farming activities including teaching, training and for job placements. The “Orti generali” were founded, and raised-bed vegetable gardens are already being implemented there. Educational activities for raised-bed gardens in schools are ongoing. The Tool(s)mart sensors have also been installed in schools. A collection of artwork/ art gallery on the LL by students from primary to high school (a form of storytelling) is planned, which might become an element of the mid-term conference in Turin at the end of September 2020;

NBS 4: Aquaponics

The application of aquaponics is still being discussed and more technical expertise will be necessary to decide where and how to best implement it. It is therefore planned to learn more from an aquaponics case which is being implemented in another part of the city and to have a deeper exchange with the City and other relevant stakeholders in Dortmund to gain from their knowledge and experiences.

NBS 5: Gren walls and green roof

Green roofs and walls will be fitted to public buildings, including the Casa nel Parco community centre, social housing, schools and other buildings. The assigned green roof on Casa nel Parco roof was refurbished. The veggie roof idea has been abandoned due to security, accessibility and maintenance issues: it is too expensive to construct safe access to the roof for the citizens with the only option being an external stairway. An additional green roof was planned to be realised in February-March 2020 on a shelter for homeless people for which a specific tendering process was employed that allows for co-design along the process. All the green roofs implemented will be cultivated extensively.

NBS 6: Making river corridors more accessible

A new green cycling path along the river Sangone will connect to the Turin metropolitan cycling network. Access to the 'Sangone beach' and improved vegetation and pollinator biodiversity is also planned. A timeline for the project has been set and provisions for allocating budget made. Inclusiveness and participation are important criteria, namely including people around the corridors as much as possible into the activities and their design (i.e. hospital for Alzheimer patients, the local police and social housing projects are already on board).

NBS 7: Local environmental compensation processes

The idea is to promote green sponsorships taken over by companies, for instance for trees in parks. One project cluster is working on geographical tools and supporting other clusters with a suggestion to create a catalogue of green actions from which companies can pick for their Corporate Social Responsibility profiles. Work on this NBS is in progress by finding ways to quantify ecosystem services provided by a green are and monetize those for financing green actions in collaboration with the private sector.

NBS 8: Pollinator biodiversity improvement and citizen science

Turin adopts a socially inclusive and bottom-up approach by working with doctors and patients of mental health centres to promote pollinator-friendly spaces across the Living Lab (Farfalle in ToUr). People with mental difficulties have been engaged and trained in monitoring butterflies. This latter activity will be expanded to include schools and additional vulnerable parts of the population.

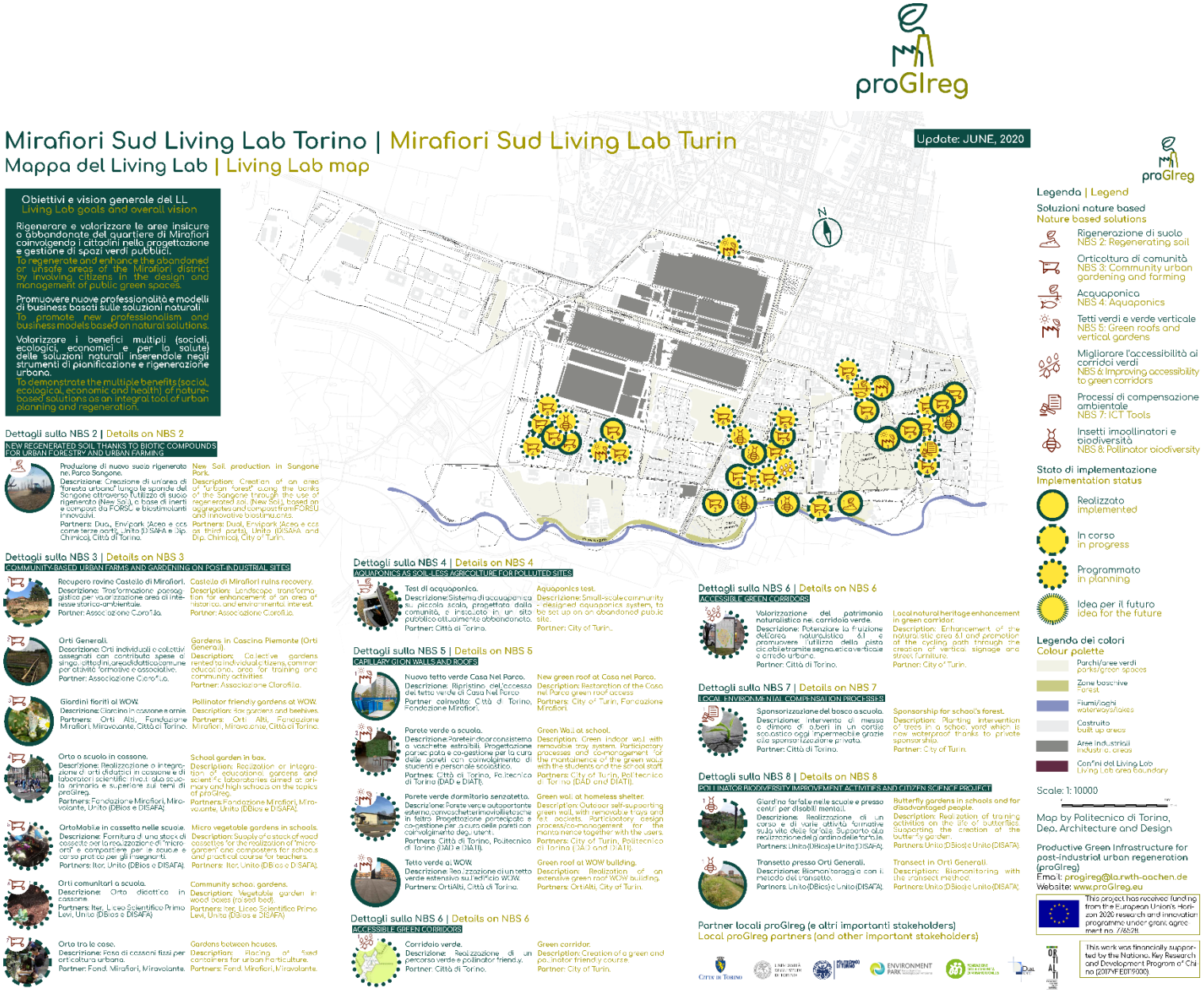

Fig. 22: Turin's Living Lab Vision Map

Zagreb

Zagreb's Living Lab is within the Sesvete district in the East of Zagreb at the foothills of the Medvednica Mountain. Sesvete is a post-industrial district (including mainly a past fuelled of car and construction industrial activities) with an entrepreneurial, young population, and a growing community-based action, which makes the district considered by some to be one of the city's most promising districts. The Living Lab area is surrounded by tall silo buildings - most distinctive the former meat-processing factory, Sljeme, right at the core of the Living Lab.

NBS 3: Community-based urban farms and gardens

The city of Zagreb plans the support and expansion of the existing Sesvete City Garden, as well as the development of a Therapy Garden. The first therapeutic garden is planned to be opened in Sesvete at the site of the former "Sljeme" industrial plant. Therapy gardens are specially designed gardens with elements such as accessible pathways, raised beds and sensory areas for adults and children with a range of physical disabilities, learning difficulties or mental health challenges.

The Sesvete City Garden will initially have around 100 units and can be extended to new areas at a later stage. The garden will enable locals to grow traditional vegetables, herbs and flowers. This is one of 13 'City Gardens' created in Zagreb since 2013 (around 2100 plots in total). A nursery at the park entrance will serve as an educational centre for local schools. Food production will be organic, and the water pumps will run on solar power.

NBS 4: Aquaponics

NBS 5: Green walls and green roof

The city of Zagreb, supported with technology from Dortmund and expertise from the University of Zagreb's Faculty of Agriculture, will test the potential of an aquaponics system on a 100m2 former industrial site. In addition, the former Sljeme meat-processing factory is to be fully revamped into a business innovation centre with a 700 square metres green roof (including 150 square metres of solar panels) and 300 square metres of green walls. At the moment, the Zagreb's proGIreg team is examining ways to combine the implementation of NBS 4 and NBS5, with a variety of buildings as potential locations. A first scenario involves the installation

of aquaponics systems in the Sesvete City Garden, which is the most possible to be implemented; the benefit here is that aquaponics will be observed and potentially used and replicated by the existing users of the garden. A second scenario includes the installation of aquaponics with green roofs and facades in local schools and kindergardens. A third possible scenario at smaller scale, aside the implementation of the first scenario, is the installation of aquaponics at the “green corner” of the Rijeka City Library.

NBS 6: Making river corridors more accessible

The city of Zagreb plans a green corridor, which will connect the LL to the nearby Sava River, and the ecosystems of the forest in the North with the river in the South. I will also link the different parts of Sesvete that are being redeveloped at the moment. This green corridor will be combined with a cycling path, which will connect the Sesvete City Garden and the new Therapy Garden with the recently developed neighbourhood of Novi Jelkovec (with more than 11,000 inhabitants).

NBS 7: Local environmental compensation processes

The city of Zagreb proGIreg team (i.e. departments of strategic planning and urban planning, in cooperation with the university of Zagreb) are committed to monitor and evaluate the environmental and social benefits of the NBS implemented. In case related impacts will be evaluated as successful and replicable, these NBS will be integrated into existing planning procedures and the respective future policy development at local level, not only in Sesvete or Novi Jelkovec, but in the whole Zagreb metropolitan area.

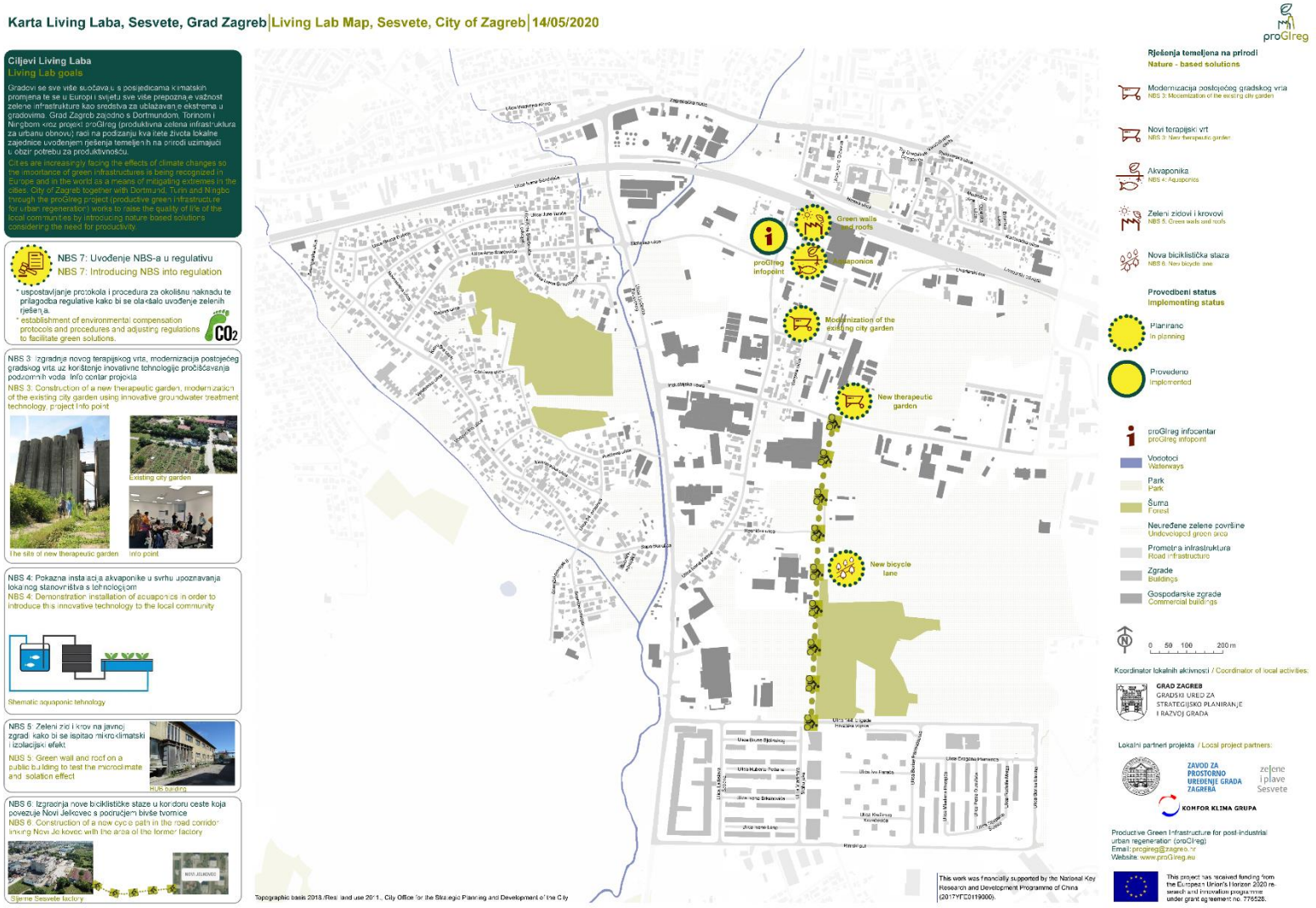

Fig. 23: Zagreb's Living Lab Vision Map

Annex 2: Actor roles in chapter 5 cases

Table 10. Actor roles in Turin's Orti Generali (chapter 5.2)

Actors	**Actor roles**			
	Consult	Involve	Partner	Empower
Association Coeffiente Clorofilla				Project manager with main responsibilities, coordinating other partners, operational decision-making.
Marginalised groups (i.e. people with physical disabilities, long-term unemployed, people with drug addition, disadvantaged youth)		Involvement in horticultural activities: People with physical disability perform activities in the seedbed; for other disadvantaged people work grants are activated.		People with drug addiction work with volunteers in the collective garden; a group of young disadvantaged people has their own garden; Plot holders receive training and support in taking care of their plot and perform pertinent tasks.
Formerly illegal horticulturists		Formerly illegal horticulturists were engaged in redeveloping the space; they receive plots in the gardening area for a symbolic fee and in exchange for maintaining common areas following the concept of a time bank.		

Local community (volunteers, social gardeners)	Interviews with students, families and senior citizens showed the need for outdoor activities and access to healthy food; Plot holders are continuously asked for positive and negative feedback to improve.	Citizens are involved as plot holders and by participating in events to engage in the transformation processes.	The management of the spaces is divided between the association, the volunteers and the social gardeners (co-management) which are periodically involved in public meetings to discuss, organize and planning the work.	Residents of the Mirafiori Sud district defined the objectives of the initiative along with the concept during focus groups; Plot holders receive training and support in taking care of their plot and perform pertinent tasks.
Cooperatives working with disadvantaged people (Cooperativa Valdocco, I Passi, Consorzio Abele); Foundation “Compagnia di San Paolo”; Fondazione “CRT”; Foundation “Mirafiori” - umbrella organization for local associations.			Collaborations with cooperatives, foundations and local associations as intermediaries to marginalised groups (i.e. long-term unemployed, people with physical disabilities).	
University of Turin (Department of chemistry, biology and agriculture)			Collaboration partner in research which assesses and analyses the social, environmental and economic impact of the project in the district and wider metropolitan city.	
Municipality of Turin and Local Health Authorities		Mediator for the department for urban green (for new projects in the area) and the City Calls Officer as support for funding.		

Table 11. Actor roles in Zagreb's planned Therapy Garden (chapter 5.3)

Actors	Actor roles			
	Consult	Involve	Partner	Empower
Municipality of Zagreb (district and city-wide representation)	District City Council provides advice.	City Office for Social Care provided a list of addresses of locally based NGOs and communal housing units for people with autism.	District representation: Office of Agriculture and Forestry oversees the management of the therapy garden; City-level representation: Office for City Planning (collaboration with other departments).	Strategic Planning Department of the city of Zagreb as coordinator of the initiative.
NGO working with visually impaired children, children with autism and other disabilities			NGO Mali Dom: in charge of operation of the initiative; strategic partner and intermediary between local contacts and future users/target group; provides expertise on appropriate design of such a garden based on user needs.	
NGO working with people with physical disabilities			Muscle Distrofy Association NGO and other NGOS and associations that attended the third co-design workshop.	
NGO working with people with autism		New Jelkovic Center for Autism		
Local NGO working with citizens			Important partner for citizen engagement in the initiative which vast experience in the area / strategic link and intermediary between the municipality and citizens.	
Local public bodies		Center for Social Welfare; Sports Club of Sesvete: provision of recreational activities for the users of	Network of homes for elderly people; Network of kindergardens.	

		the therapy garden.		
Private sector		Happy Shovel: offers indoor gardening and innovative indoor food production; Therapy horse riding company: offer horse rides in the green corridor.	ZRINJEVAC - private firm that could teach gardening and planting.	
Supplier			City of Zagreb Holding Company: A landscaping firm in charge of maintenance of public spaces in Zagreb under the ownership of the city will be involved for maintenance.	
Local community	Interested citizens were consulted through questionnaires.	Citizens with family members with disabilities can get directly involved.		
Other local NGOs		ISKRA NGO representing vulnerable groups; OSTVARENJE NGO to plan and implement artistic activities, drawing workshops with kids and youngsters.		

Table 12. Actor roles in Turin's "Farfalle in ToUr" (chapter 5.1)

Actors	Actor roles			
	Consult	Involve	Partner	Empower
Department of Life Science and Systems Biology of the University of Turin			Partner with users and scientists in all activities of design and implementation: formal collaboration with HMC and the educators of the Social Cooperative; Scientific design of the project, monitoring and data processing; deliver curricula with users of HMC.	
Users of HMC	Curricula and activities are designed according to their needs.		Main implementors of the initiative (create, monitor, learn, teach).	
Mental Health Centre (HMC) – belonging to the Local Health Company (LHC)			Project idea; formal collaboration with educators of the Social Cooperative and the University of Turin.	
Educators of Social Cooperatives (IL MARGINE S.C.S. – ONLUS)	They are consulted for expertise on users of HMC.		Partner with users and scientists in all activities of design and implementation: formal collaboration with HMCs and the University of Turin.	
Schools			School administration partners with Mental Health Centres and scientists (formal or informal agreement).	
Students in schools		They directly engage with users of HMC in lessons.		

Table 13. Actor roles in Dortmund's pollinator-friendly raised beds and future food forest (chapter 5.4)

Actors	Actor roles			
	Consult	Involve	Partner	Empower
NGO – the Urban-isten				Facilitators of the initiative.
Local association - scouts		Through questioning, discussions and queries, their wishes were anchored in the food forest concept.		Main users of the area; the concept of the food forest is based on workshops with the community and scouts; they determine the planning and decision-making process
Residents and church congregation		Through questioning, discussions and queries, their wishes were anchored in the food forest concept.		The concept of the food forest is based on workshops with the community and scouts. Workshop participants can steer decisions and actions through discussion.
Church (executive committee)	Initial consultation regarding area and plans for the area.		Landowner; informal agreement with few specifications for the planning.	
Expert			Partner in conception of food forest and permaculture.	
Suppliers			Seed, soil and fertilizer supply; advice.	
Municipality	Exchange and discussion in regular jour fixe.	Advice, support, conducted soil pollution tests.		