LIVING LAB HANDBOOK FOR URBAN LIVING LABS DEVELOPING NATURE-BASED SOLUTIONS

UNaLAB
URBAN NATURE LABS
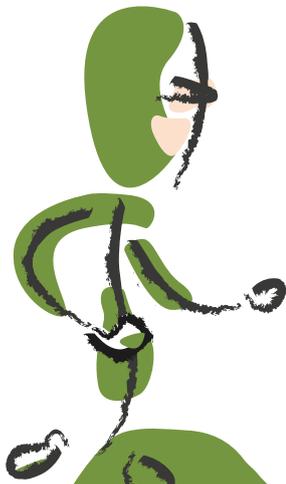
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ABOUT THE URBAN NATURE LABS PROJECT (UNALAB) ●

Cities all over the world are facing a broad range of challenges due to climate change and ongoing urbanization. The UNaLab project is contributing to the development of smarter, more inclusive, more resilient and more sustainable urban communities through the implementation of nature-based solutions (NBS) co-created with and for local stakeholders and citizens. Each of the UNaLab project's three front-runner cities – Eindhoven (The Netherlands), Genova (Italy) and Tampere (Finland) – have a strong commitment to smart, citizen-driven solutions for sustainable urban development.

Nature-based solutions are inspired by, supported by and copied from nature. These include, but are not limited to green roofs, free-standing living wall, single line trees… and many others.

The establishment of Urban Living Lab (ULL) innovation spaces in Eindhoven, Genova and Tampere support on-going co-creation, demonstration, experimentation and evaluation of a range of different NBS targeting climate change mitigation and adaptation along with the sustainable management of water resources.

02.

INTRODUCTION ●

The Living Lab approach is one of the most well-known and successful approaches for developing innovations. There are many aspects to consider when setting up a Living Lab in terms of organization, operations, resources, business models, users / citizens, openness and value.

By reading the following pages, you can learn how to develop an Urban Living Lab, based on the experiences, research and practical experience from the UNaLab project. The tips included here are given by the Living Lab experts who have successfully set up a Living Lab in their own community. You will learn what questions need to be asked, who is working in a Living Lab and what obstacles you need to watch out for! At the end of the handbook, you will find an interactive tool to guide you through your Living Lab journey.

In this handbook, we are focusing on Urban Living Labs – meaning Living Labs operating within an urban setting (in a city). This urban setting can be as narrow as a single street or as wide as the city as a whole. You can modify this approach to use it in other contexts as well – for instance in a rural environment. In Living Labs, the space for the experimentation is always a real-life setting: the solution is tested in the real-life environment, right where it is planned for (for example, on a street).
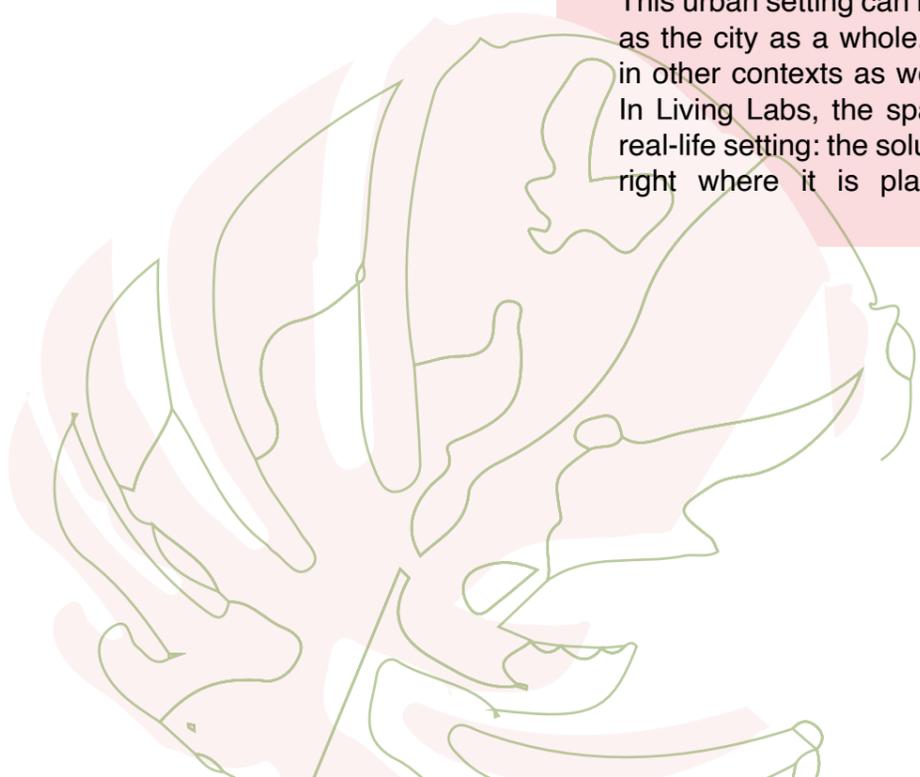
03.

WHAT ARE URBAN LIVING LABS

There is a growing trend to involve citizens in city development, to make urban areas more adaptable to citizen needs. It is important to look ahead in considering the consequences of, for example, climate-related problems in the cities, such as air pollution, flooding, etc. and at the same time, considering the social implications of the solutions that we built in our urban areas. To address such complex problems we must involve not only citizens but also companies, research communities and educational organisations, as well as the public sector to collaborate towards shared solutions.

Urban Living Labs (ULLs) are the orchestrators of this collaboration, bringing together the different stakeholders (companies, research communities, public sector and citizens) through co-creation. Co-creation is a process of collaboration between these actors in working together towards a shared solution.

Several researchers and studies have defined and interpreted the Urban Living Labs in different ways. Despite this, what is common in all these definitions is that the innovation should be developed in a real-life setting and the city should be considered as the development context. Moreover, one of the core premises of Urban Living Labs is to engage citizens in the process of development of a solution, starting from the beginning of the process.

The aim of citizen engagement is to give citizens the opportunity to decide on the solution that will affect their life later on. That will also increase the possibility of acceptance and success of the developed solution – for example a nature-based solution. In the next section, you will find seven key components of Urban Living Labs that are developing nature-based solutions.

Urban Living Labs include seven key components. These key components are:

1. The governance and management structure reflects on the way that an Urban Living Lab in the strategic or operational level is managed and organised. All Urban Living Lab activities must be supported by the local governments, decision makers in the cities as well as the politicians. In this regard, the Urban Living Lab vision and scope, risk management, closing the project, knowledge sharing as well as dissemination activities should be taken into account.

2. Financing and business model considers a sustainable business model that creates, delivers, and captures value for all Urban Living Lab stakeholders. It is of vital importance to consider whether the business model is clearly defined. Is it appropriate to support long-term commitment? What does the Urban Living Lab maintenance plan look like? Who are the financers? In addition, what do they bring and who will pay you and for what?

3. The **urban context** is the physical setting in which the nature-based solution will be implemented. It can be a street, district or the city as a whole. In relation to the urban context, place, ownership, physical infrastructure, technical infrastructure, future plans, responsibility and other activities must be taken into account

4. In respect to the **nature-based solution**, it should be innovative, address multiple sustainability challenges in real-world situations by using nature. Here, it is necessary to understand the aim of nature-based solution, the value is being co-created (what and for whom) and those who will be involved in nature-based solution development process


Figure 1 Seven key components of ULLs

5. Partners and users reflect on the Quadruple-helix approach with different roles namely, public sectors, private sectors, research institutes and citizens. The stakeholders might be affectees with a passive role, experimenter, innovator, lead participants or only testers. Regarding the key stakeholders, it is important to take into account their objective to contribute, their motivation, degree of engagement, activity type and their membership model.

7. The ICT infrastructure are existing and desirable ICT tools and infrastructures support the ULL activities. They can be hardware, software, network or produced data within the ULL activities. It is necessary to think about questions such as what is an ICT infrastructure in the context of nature-based solutions, who uses it, where is it located and why is it used.

6. The Approach and methods can be related to different data collection and analysis approach in the Urban Living Lab process, supportive tools as well as various engagement methods. In this regard, openness and inclusiveness, explorative approach, responsibility and sustainability and value creating must be taken into account.
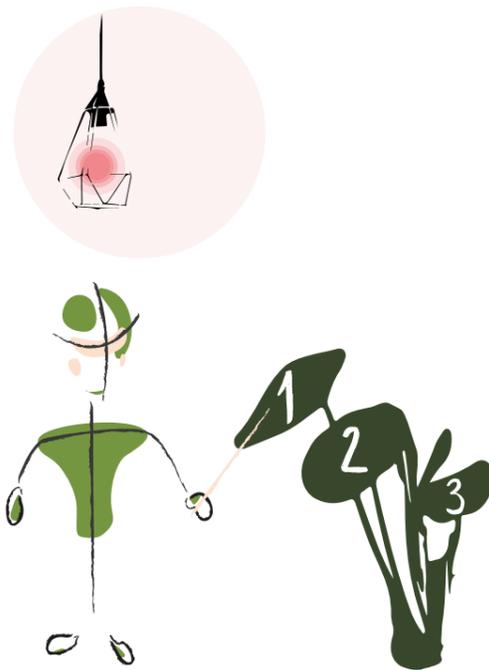
The advice of **Finnish Laurea Living Lab** is to prepare a funding plan to define the essential needs on which funds have to be spent at the beginning of the ULL development.

04.
CITIZEN ENGAGEMENT

Citizens can be involved in different levels and scales in an Urban Living Lab (Juujärvi & Pesso, 2013). Like the traditional user engagement approach, citizen engagement in an Urban Living Lab can be put under six main categories (Ives & Olson, 1984): no engagement, symbolic engagement, engagement by advice, engagement by weak control, engagement by doing, engagement by strong control.

- **No engagement** is when citizens are unwilling or not invited to be engaged in the NBS development.
- **Symbolic engagement** is when input from the citizens is requested but not used.
- **Engagement by advice** is when citizens' advice is asked with the help of interviews or questionnaires.
- **Engagement by weak control** is when citizens have more responsibility to be a part of solution development, however they can "sign off" at any stage of the solution development process.
- **Engagement by doing** is when citizens are active participants in the solution development process and influence on the process in all stages
- **Engagement by strong control** is when citizens have the power of decision making on the solution development process in an Urban Living Lab and the outcome will be highly affected by the citizens' ideas, needs and expectations.

Follow the next steps guiding you from identification to implementation to embark on your citizen engagement strategy.

IDENTIFY.

Clarify citizens' characteristics to understand them in depth. Plus, identify in which role they are involved (lead user, innovator, customer, visitor, end-user, employee, as a private person, etc).

INTERACT.

Enable interaction within the ULL team, and with other stakeholders outside the NBS development team, such as public authorities and citizens. Focus on generating citizens' needs instead of identifying requirements of the NBS. Citizens' needs stimulate creative thinking within the NBS development team. All engaged partners need to have open minds to what citizens express. The technology must adequately support the interaction among various stakeholders.

INFLUENCE.

Influence in citizen engagement can be interpreted in two different ways:

1. Citizens can influence the NBS development if they are engaged in the process from the beginning. They will actually have an influence on the NBS instead of only giving feedback on the developed solution.
2. The potential influence of every stimulus applied in citizen engagement processes should be taken into account and discussed in the NBS development team. The actual influence positively contributes to empowering citizens, which in turn increases the motivations of citizens in an ULL context.

INFORM.

Engage citizens as partners. Invite them to all the NBS development phases, but with different roles and responsibilities. Inform them about their role, your expectations, and their freedom to choose. Be honest and open towards the citizens.

ITERATE.

The iterative process of understanding citizens' needs and ideas has different objectives:

1. Enhance the understanding of the NBS development about the citizens' situations.
2. Build citizens' knowledge about the potential solutions and different viewpoints.
3. Value the design decisions throughout the NBS development process.

Citizens' are empowered because they can follow how their voices are heard in the NBS process, from an idea until the final developed NBS.

INSPIRE.

Citizens should be inspired to change. The NBS developer team should be inspired to expand their solution horizon.

Citizens should be inspired to express themselves in their own language and express their situations and the goals they aim to achieve in their real-life. To inspire the NBS developers, citizens may also be inspired to envisage a preferred future state and to explain this state. Moving the results from one context into another inspires citizens to elevate their viewpoint, which in turn opens up for new solutions. Implementing a surprise in a heterogeneous group of citizens in real-life context facilitates creative thinking and expands the citizens' boundaries.

ILLUMINATE.

Make an open environment in which the citizens feel comfortable about expressing their thoughts. By encouraging citizens to open up and illuminate vital aspects about their current life situations, it becomes possible to co-create and implement an NBS according to their needs, situation as well as their expectations.

INTEGRATE.

Integration can be interpreted in two ways.

1. Representations of citizens' needs should be integrated in the NBS co-creation in which increases the chance that the final NBS will provide benefit for all relevant stakeholders and the society as a whole.
2. When the NBS design is introduced, it should be integrated in the citizens' real-life everyday use context based on the gained knowledge in the interaction process.

IMPLEMENT.

Implement. One central point of citizen engagement is to co-create, implement and test the results in the users' perceived real-life setting. Create as authentic a situation as possible for the citizens to make it possible to get their real input. It is worth mentioning that the NBS and ULL team should be open and attentive to what is happening during the citizen engagement process. Citizens usually resist changing their behaviour. Therefore, they should be motivated and reminded to use the implemented NBS on a regular basis in their real life context.

CITIZEN ENGAGEMENT ADVICE

1 Citizen engagement must be **voluntary**

2 Attempt to **maximize the difference** between different categories of users

3 **Be inclusive** to maximize the difference among user categories, all kinds of ages need to be represented

5 Attempt for a balanced gender distribution. Traditionally, male engagement leads to developments focused more on technical performance, while female engagement leads to developments with a focus on human needs and expectations.

4 Engage citizens who are flexible towards change and have a strong social competence. One single saboteur can completely destroy an NBS development.

6 Citizen selection should be on the citizens who are in different levels of **knowledge about the area of NBS**

7 Spend enough time to **investigate the innovation's functionality** before engaging citizens in larger scale

9 Give the citizens the feeling that **their contribution is important**

8 A **clear and on-time communication** and interaction with the citizens is necessary

10 Manage the citizens' expectation
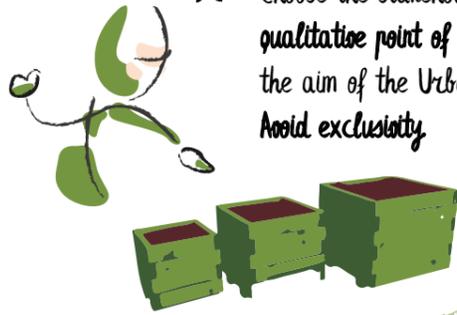
11 Ensure **flexible and appropriate timing** of their engagement

12 Avoid to prolong the engagement activities and **divide the task into micro tasks** where applicable
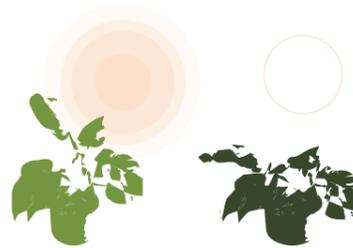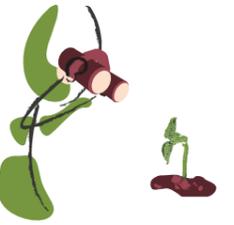
14 Choose the stakeholders from a **qualitative point of view** depending on the aim of the Urban Living Lab. **Avoid exclusivity.**

13 Consider an appropriate financial reward or a small gift for their engagement

● **Additional considerations** ●

Think globally and act locally:

Start with issues relevant to citizens' daily lives and enable them to decide on their level of engagement. Try to tackle the lack of interest by defining clear contact points and communication.

Foster personal relationships:

To ensure that the citizens are engaged in key activities with an active role you can establish a more personal approach.

The importance of planning:

It is necessary to be more target-oriented than task-oriented and to be flexible to change the direction according to what happens during the citizen engagement and NBS development process. People are creative and innovative and valuable sources of external knowledge.

Heterogeneity of citizens and recognition of individuals of the community are vital:

Attempt to engage citizens from all groups. More diverse group of citizens create higher attraction, but at the same time individual recognition is crucial.

Facilitation will influence the process and the outcome:

As a facilitator, you should be patient, active and at the same time not trying to control citizens' activities. Use reminders where applicable such as e-mails, SMS, newsletters, etc. to raise awareness and increase the access and activity level of participants.

Various communication channels are required:

Different citizens use different communication channels. Give your citizen participants access to many channels to choose from depending on their situation, attitude, personality and the topic. Some people prefer to debate and some want to vote for stated alternatives, some will provide know-how, suggestions and advice and some will write their requests.

Native language is core:

For engaging citizens and to get true participation, the communication language is essential for many people, since they will contribute from the heart, it might have positive effect if they express themselves by their own native language.

Real-time events:

Real-time events are not easy to be handled. It is difficult to engage citizens with short notice and without proper preparation, especially if the NBS needs advanced technologies or if the engagement process for the citizens is complex. Always consider the citizens activities to be easy to understand, easy to use and not time-consuming for them.

Engagement expertise is required:

Engage skilled professionals with high levels of expertise in the team to take care of the situation and moderate the engagement process.
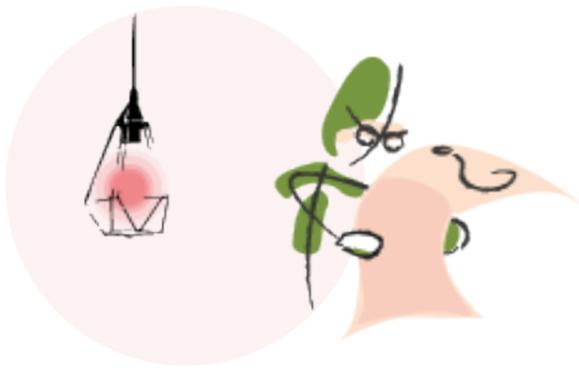
LIST OF POSSIBLE QUESTIONS THAT NEED TO BE ADDRESSED WHILE CITIZENS ARE ENGAGED

MOTIVATION

- What is the main motivation for engaging citizens?

- What are the citizens' main motivations for being engaged?

- What do we (as ULL team) expect to achieve with citizen engagement?

CITIZENS

- What types of citizens should we engage, and why?

- What type of citizen relationship do we want to have and achieve?

PROCESS

What degree of citizens' influence do we want to achieve?

4.2. PROMOTION, DISSEMINATION & COMMUNICATION

Think about these when defining your communications strategy:

Citizens are central actors in social innovation, promotion of activities naturally follows

Build activities together, providing an open space for the "animators" – university, municipality, business etc. to involve the citizens.

KRAKOW LIVING LAB ADVICE

1 Make sure your activities are visible and accessible, held for example in public spaces.

2 Placing people at the centre of everything, and being conscious of your target group(s) is key in capturing their attention throughout your activities – these are your chances to communicate with your visitors/participants, good experiences lead to good word-of-mouth and wider audience.

3 To better understand the perspective of citizens and challenges they face in real life, invest your time to go and meet them in their own territory in the place that is convenient and familiar for them (co-design workshops and consultation meeting held in the local places as schools, libraries, cafes). Keep an eye on real life context.

4 Create an open inspirational atmosphere for exchanging opinions and discussion

5 Concentrate and emphasize the strength of personal individual experience each citizen brings to the community and challenge faced.
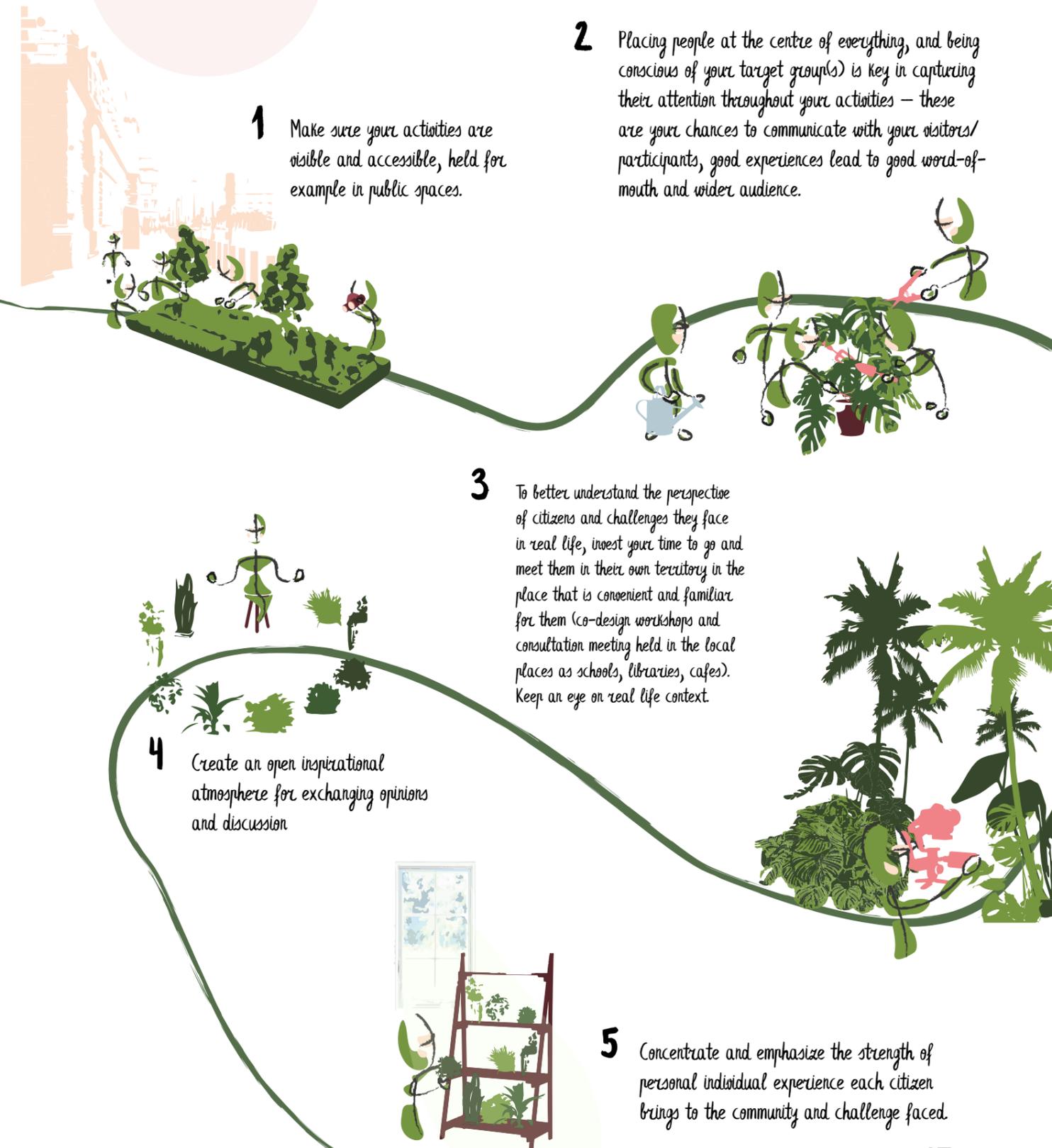
6 Listen carefully and reiterate what was said — this makes people really valued and committed, they fell that their opinions matter

7 Remember not to impose your opinions and views too much when involving community into discussion and co-creation processes

8 Stay present and engaged with work of the citizens — do not shut down their creativity, lead alongside

9 Be aware that the creation process is complex and has its own ups and downs. Remember about divergence and convergence circles and use them according to the situation.

INNOVATIVE SOLUTIONS FROM ENOLL LIVING LABS

One Living Lab has built a diploma for promoting the results of their Living Lab for students, citizens & start-ups, etc..

Another Living Lab has created curricula for learning about the technologies, to teach elderly and younger people about the new technologies utilized. Promoting awareness and motivation led to discussions on reward mechanisms, incentives and gamification.

INVOLVE PARTNERS AND STAKEHOLDERS

Meeting partners and stakeholders on a regular basis and building bridges between different groups, local authority and people, businesses and service providers, is central in Living Labs. Political communication with institutions is important to help policy makers understand the situation on the ground.

USE A MIX OF COMMUNICATION CHANNELS

Do not rely on one channel, but think about the multitude of opportunities out there: social media, advertisements, video clips or live streaming of events, as well as visual instruments like roll-ups or posters in public spaces. If you can, also use local news and media.
Some Living Labs have built their own communication platforms or groups to communicate.

KRAKOW LIVING LAB ADVICE

- Stay active and involved in interest groups on Facebook or other social media channels and activities of relevant NGOs.

-Take part in the discussions, workshops and meetings organized by varied group of stakeholders as well as debates and open roundtables organized by policy makers. Invite both parties for events and meetings you organize at your venue.

- Keep dialogue open and inspirational, look for synergies and added value in everything you plan and do.

Be part of the change — in the long distance it is the only right approach you build with not only trust, commitment and respect but also with knowledge. Whatever you propose or recommend will have stronger impact if you are well recognized and respected by citizens.

You need to show the benefits of getting involved and how it is impactful for the stakeholders.

KRAKOW LIVING LAB ADVICE

Take into consideration that there are different approaches when communicating with your teams or multiple groups of stakeholders. You may lead with a strong point of view or lead alongside — both approaches have their pros and cons. Think what you want to achieve, what is your goal and what group of citizens you would like to involve. Always tailor you approach to currents needs, requirements and expectations of the citizens.

INTERNAL COMMUNICATION

Examples of successful – and not so successful – communications within a project or a team can teach you valuable lessons about external communications as well. Think about a communications plan, and think about looking in as well as looking out.
Partnerships and networks help in creating bridges between organisations, to share knowledge, and widen outreach. Think also about your own organisations and teams – what about the awareness among your own employees?

05.

HOW TO SET-UP AND RUN AN URBAN LIVING LAB ●

This section will guide through the different phases of Urban Living Lab development. These phases are Planning and Setting up, Exploration, Co-creation, Implementation and Test and Evaluation. You can use these guidelines to set-up a Living Lab in a rural environment, as well. Likewise, the same methodology described here can be used to implement other solutions apart from nature-based solutions.

At the back of the handbook, you will find cards for an interactive workshop guiding you through different phases of Urban Living Lab development.

Within the planning process of setting up and running an Urban Living Lab for nature-based solutions development, it is of vital importance to obtain as much information as possible regarding the following points:

1. The background of the nature-based solutions
2. Aim and scope of the nature-based solutions
3. Different perspectives on the nature-based solutions
4. Relevant skills that are needed within the nature-based solutions development team
5. The context of the nature-based solutions development (urban context, including streets, districts, parks, etc.)
6. Constraints and boundaries that need to be clearly defined and agreed upon.

In this phase, it is necessary to achieve a shared perspective on the objectives of the solutions implemented. In this regard, a mixture of various competences in an Urban Living Lab stimulates knowledge sharing and enhances understanding of the quadruple helix stakeholders' visions (public sectors, private sectors, research institutions and citizens).

In the planning process, it is important to take the key Urban Living Lab principles into consideration. For example, the team should think about following questions. How can value be co-created for the citizens and other stakeholders? How can the citizens influence the solution development process? How are sustainability aspects addressed? How is openness considered, and how should the innovation process be designed to capture an as realistic situation as possible? That is, the solution implementation, test and adoption should be carried out in a real-life context.

Examples of the questions you need to think about before starting the actual solution development in Urban Living Lab context are presented below. When all these questions have been addressed and discussed, the detailed planning of the solution can start.

What risks are associated with the development of a solution / NBS? (the risk assessment in relation to the governance and management key component)

What are the background and needs that formed the solution / NBS idea?
Why is the solution/ NBS relevant?

In which context is the NBS planned to take place or to be installed? (Consider the cards in the urban context key component, such as street, district, parks, etc. of the toolkit at the back of the handbook)

What, in your context, can the NBS influence? (Consider the cards in the urban context key component, such as future plans for the context)

What is the Urban Living Lab's vision and scope?

Are there any other products or services being developed during the solution / NBS development process?
• Yes
• No
• Don't know

What context might influence the NBS development? (Consider the cards in the urban context key component, such as physical security)

Identifying the target user group, citizens, visitors, customers, potential users, as well as non-users.

What problem or opportunity does the solution / NBS aim to contribute to?

What are the important frames for the solution / NBS?
• What are the economic frames? (consider the actions in relation to the financial and business model key component)
• What are the possible revenue streams for the Urban Living Lab?
• What does the Urban Living Lab partnership model look like?
• What does the Urban Living Lab cost structure look like?
• What resources are needed to start the Urban Living Lab and NBS project (or any other projects where solutions are implemented)?

Are there any ethical considerations that need to be considered before starting the NBS development?

Which important timeframes need to be handled?

What technical equipment does the NBS require?

What needs do the involved stakeholders and citizens have? (discover stakeholders need)

How to motivate different stakeholders (including citizens) to be engaged in the NBS development process?
• Winning of a prize
• Monetary incentives
• Learning
• Technology in return

Closing the project - how should the NBS project be closed?

Are there any power relations that need to be considered and how can these influence on the Urban Living Lab and NBS planning?

What competencies and resources are important to involve in the process?
• Content providers
• Distributors
• ICT consultant
• Developers
• Customers
• Citizens
• Other

**How to keep the stakeholders engaged?**

Who has the power to realize the ideas?
• Who makes the decisions?
• Who are the informal leader that should be contacted?
• Who can stop the Urban Living Lab or NBS process?

Stakeholder identification: Who are relevant stakeholders that should be involved? (here the actions and descriptions in the key stakeholders key component cards should be considered)
• Public sector
• Private sector
• Academia
• Citizens
• Others

How to form a positive dialogue and contact with the relevant stakeholders?
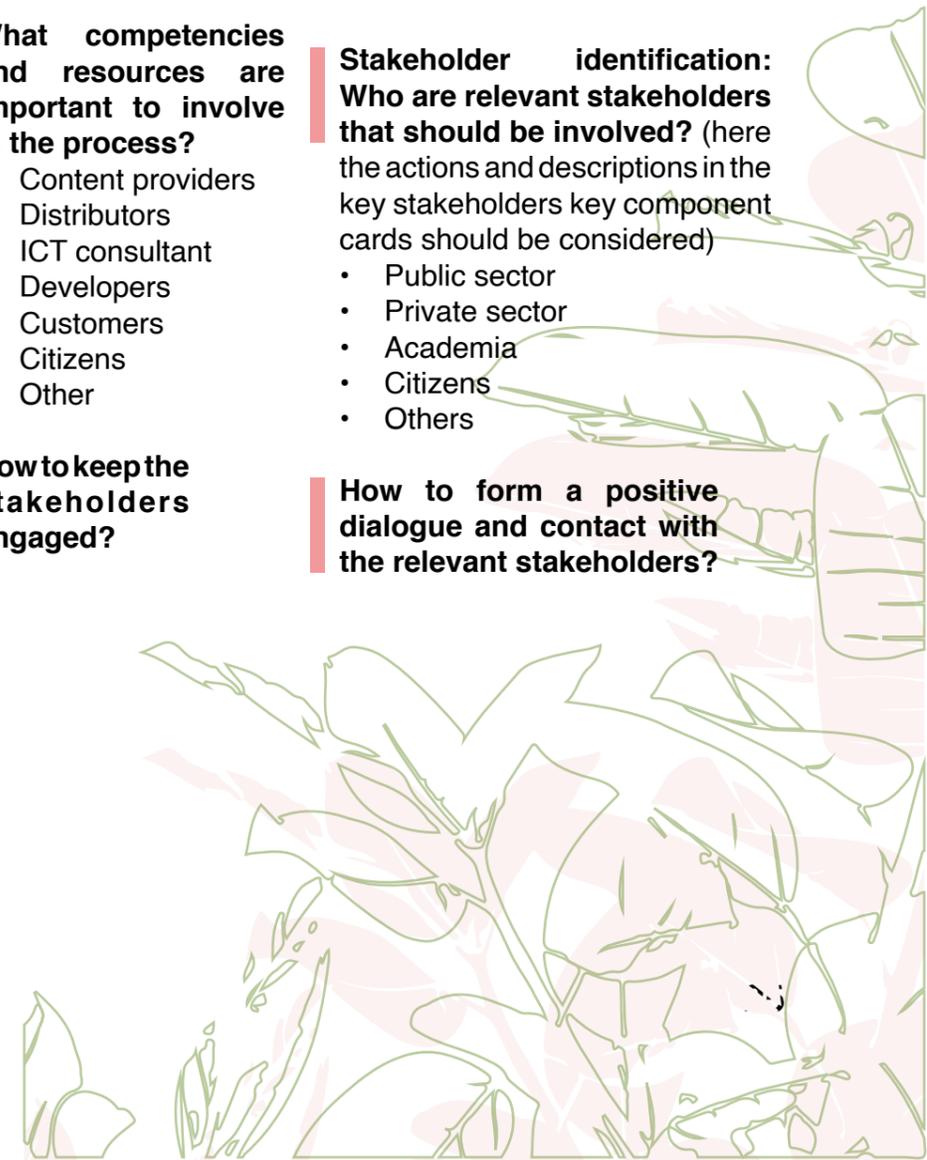
One important aspect to consider when developing an Urban Living Lab is what roles need to be taken order to ensure smooth execution of the activities. In this section we present the internal roles – those are people working for the Urban Living Lab and also the external roles - the people Urban Living Lab staff interacts with.

The internal roles are important to consider while setting up and managing an Urban Living Lab while the external roles are more important while managing Urban Living Lab activities.

INTERNAL ROLES
- ULL manager
- Human interaction specialist
- Pilot manager
- Panel manager
- Project manager

EXTERNAL ROLES
- Innovators
- Users
- Affectees
- Problem owners
- Financers
- Context providers

PILOT MANAGER
- Facilitates the implementation and test of the innovation being developed
- Plans, coordinates and implements real world experimentations centred on users and affectees
- Can be employed by the ULL, but not always the case
- Coordinates the interaction between other roles (innovators, users, problem owners and project manager)

PANEL MANAGER
- Recruits and interacts with a panel of citizens, users, affectees and others involved in test & evaluation activities
- Determines which users to involve in the process and how to interact with them (together with the Human Interaction Specialist)
- Responsible for communication, invitations and privacy protection of the panel
- Distributes information about experimental pilots externally
- Work in the background of the pilots
- Plans and coordinates interaction with the panel; coordinates communication between stakeholders; informs other stakeholders about activities in pilots

— INTERNAL ROLES

URBAN LIVING LAB MANAGER
- Manages everyday practices of the ULL
- Is a front-person
- Develops ULL projects
- Ensures the ULL is maintained and used by intended users
- Ensures the ULL creates value for the city
- The person working as an ULL Manager can cover more than one internal role

HUMAN INTERACTION SPECIALIST
- Performs user-centred interactions
- Analyses results from different human interaction methods
- Either employed by the ULL or on project level
- Plans the innovation process, designs concepts and principles, need-finds studies, tests and evaluates
- Tests the solution in the real world context prior to implementation

— EXTERNAL ROLES

INNOVATOR
- Person who has the endeavour to develop innovative NBS and wants to do it in an Urban Living Lab
- Either employed by the city, a SME, a large company, a NGO or a citizen
- Power over the development of the innovation (what to include in the final design / when the innovation is ready for implementation and test)

USER
- Uses NBS when it is fully implemented
- Either employees at the municipality, citizens or others using the final solution
- Contributes with contextual rights, their needs, values and goals related to a specific situation / solution
- Can contribute to all phases in the Urban Living Lab process with discussions and evaluations of ideas, concepts, prototypes and final solutions

AFFECTEE
- In the city context this person is affected by the implementation of the solution without being a user of it
- People living in the city or visiting but not interacting with the solution
- Does not use or purchase the solution
- Has little or nothing to say in the development of a solution since they are not users or consumers
- Urban Living Lab strengthens influence of affectees and makes their voice heard
- Urban Living Lab finds ways to stimulates the affectees to contribute to the design and development of NBS even if they are not aware of innovation's existence in their city context
- Affectees might not be interested to contribute with their insights since they don't see a direct impact of their feedback on the solution since they are not directly involved in the innovation process
- This group is expected to grow due to the growth of smart city and nature-based solutions

PROBLEM OWNER
- Can be the city owning a specific problem
- Can trigger Urban Living Lab activities to start or can contribute to Urban Living Lab activities to get a solution to a problem
- Contributes to need finding through their knowledge about the problem area

CONTEXT PROVIDER
- Involved in implementation activities and relationship dependencies with the Urban Living Lab
- Determines if it wants to participate in Urban Living Lab activities and how and where NBS can be developed
- In UNaLab project context providers are the cities (ownership of the land)

FINANCERS
- Is an organization that funds the research and/or development of NBS (for example, in UNaLab project the European Commission is the financier)
- Can become a gatekeeper – possess external resources for ULL activities; they have the power to influence what is done and how
- Influence over Urban Living Labs actors' decision making through reviews and feedback

In the exploration phase is it important to gain as much information as possible about the underlying circumstances for the NBS development process. One important aspect of the exploration phase is to gain insights into what needs citizens might have that the NBS can fulfil. Here are some examples of the questions and points that need to be considered in this phase:

What is the specified aim of the NBS development within the Urban Living Lab team?

- **How should citizens be recruited?**
- **What are recruited citizens expected to do?**

What ICT roles should be involved in the NBS process?
- ICT consultant
- IT manager

Does the NBS stimulate creativity and support the generation of new ideas?

- In which social context is the NBS planned to be implemented?
- In which physical context is the NBS planned to be implemented?
- In which technical context is the NBS planned to be implemented?
- In which organisational context is the NBS planned to be implemented?

What ICT infrastructures for NBS development are needed? (the ICT infrastructure key component cards should be considered)
- Hardware
- Software
- Data (public, private)
- Data ownership
- Networks (4G, fibre, etc.)

Who are the target users on the NBS?
- Who benefits from the NBS?
- Who would not have any interest?

Are the Urban Living Lab key principles addressed in the exploration phase?
- Value
- Influence
- Sustainability
- Openness
- Realism

Is the NBS start dependent on open calls?
- Is it disseminated in public channels?

5.3. CO-CREATION

The aim of the co-creation phase is to develop concepts or rough prototypes of NBS based on the identified needs from the exploration phase. The concepts need to be detailed enough for the user to understand the basic objective with the functions of the innovation. Here you will find examples of the questions to think about before starting the co-creation of NBS in Urban Living Lab context. When all these questions have been addressed and discussed, the NBS development in Urban Living Lab context move forward into the next phase (implementation).

How should the citizens be engaged in the NBS development process?
- Interviews?
- Workshops?
- Focus groups?
- Mock-ups?
- Observations?
- Scenarios, visual
- Narratives
- Other?

What supportive tools are required for co-creation? (here, the approaches and methods key component cards should be considered)

How different co-creation activities might happen?
- Workshops
- Interview
- Brainstorming sessions
- Others

Decide how to record the data produced and collected from the co-creation activities?
- Camera
- Notes
- Video
- Audio
- Other…

Which citizen requirements are most relevant in relation to the purpose of the NBS?

What information needs to be classified, categorized and organized from the exploration phase?
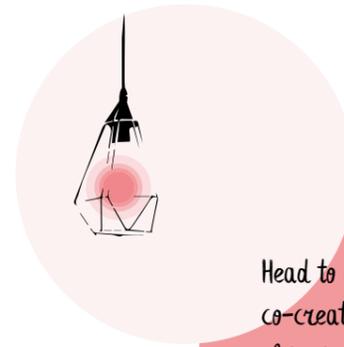
What value is co-created in the process for all stakeholders?

Are the Urban Living Lab Key Principles addressed in the co-creation phase?
- Value
- Influence
- Sustainability
- Openness
- Realism

Which relevant values have been expressed by the users in the exploration phase?
- What do they not want to change?

Head to our co-creation toolkit, to choose from a wide range of co-creation tools and methods. The toolkit can be used as a source of inspiration and to prepare a co-creative session with various stakeholders. Co-creation is the act of working together. To ensure a truly collaborative and "co-creative" approach, you should equip yourself with various methods and tools found in this toolkit.

Website: https://uralab.enoll.org/

CITY OF EINDHOVEN, THE NETHERLANDS ADVICE

If you do not have experience with co-creation, start with simple tools. People need time to get used to co-creation.

It takes time for people to get involved. Public servants also need to get used to the new way of working.

Inhabitants are mostly enthusiastic when they get involved in projects taking place in their community. However, it is difficult to find new people to join co-creation processes.

The aim of this phase is to test and evaluate developed NBS in the Urban Living Lab context in a real-life setting. Within the test and evaluation phase, it is important to encourage citizens to express their thoughts and attitudes towards the co-creation and implementation activities from the previous phases. Examples of the questions that need to be considered in this phase are:

Within the NBS implementation phase, it is important to discuss the citizens' requirements (needs, goals, citizens experience goals, values etc.) that have been identified and presented in the co-exploration and co-creation phases. Examples of questions in this phase are:

How should associated risks with NBS development in Urban Living Lab context be managed (here, the governance and management key component cards should be considered)?

Which physical infrastructure is available?
- Streets
- Electricity
- local transports
- others

How can they experiment with it, which activities will they do?

Who owns the NBS setting? Who can stop the NBS process?

Who has access to the developed NBS? Is it open or restricted?

Which activities does the physical context of NBS development currently support and for whom?

Is the context that the NBS planned to be implemented a real-life context?

Where is the physical setting?

Are the Urban Living Lab key principles addressed in the implementation phase?
- Value
- Influence
- Sustainability
- Openness
- Realism

Who can experiment with the NBS?

What is the aim of the test and evaluation of NBS? What does the Urban Living Lab team want to achieve?

What technical equipment does the NBS test and evaluation require?

What are the conditions that need to be considered during the NBS test process?
- Damp
- Pollution
- Forest
- Other

Which technical infrastructure is there available in the context to test and evaluate NBS?
- Fiber
- Wifi
- 4G
- Sensors
- IoT

How will the NBS test and evaluation results be used?

Which data collection methods should be used in the NBS testing and evaluation?
- Observations
- Interviews
- Focus-Groups
- Diaries
- Questionnaires
- Other

Are the ULL Key Principles addressed in the test and evaluation phase?
- Value
- Influence
- Sustainability
- Openness
- Realism

What are the selection criterions?
- Age
- Gender
- Occupation
- Technical skills
- Knowledge and competence

For how long should the NBS testing last?

How should the test participants be motivated to test the NBS?
- Winning of a prize
- Monetary incentives
- Learning
- Other

How many citizens should be recruited for the NBS test and evaluation?

What ethical considerations during the test and evaluation process of NBS need to be handled?
- Unwitting participation (e.g., in crowdsensing)
- Voluntariness of citizen engagement
- Cost and benefits of engagement for the citizens
- Consent forms
- Other

In this phase, the developed NBS in the context of Urban Living Lab is adopted by the final users, including citizens. Examples of the questions that need to be handled in this phase are:

How should the NBS results be disseminated? (here, the governance and management key component cards should be considered)

Who are the main adopters of the NBS in the Urban Living Lab context?

Are the Urban Living Lab key principles addressed in the adoption phase?
- Value
- Influence
- Sustainability
- Openness
- Realistic

How should the identified NBS adoption barriers be tackled?

Is the test plan open for citizens to participate?

How should the gained knowledge from NBS development be shared within the various stakeholders and citizens?

- **In which social context is the NBS planned to be adopted?**
- **In which physical context is the NBS planned to be adopted?**
- **In which technical context is the NBS planned to be adopted?**
- **In which organisational context is the NBS planned to be adopted?**

What technical equipment does the NBS adoption require?

What barriers are associated with the adoption of NBS?

What are the future plans for the context of NBS development?
Are there any and who has them?

06.

COMMON PITFALLS IN SETTING UP A LIVING LAB

Not enough time to build trust

Your Living Lab is the innovation intermediary that orchestrates a multi-stakeholder ecosystem, but this is a role that requires some time to consolidate. Stakeholders need to feel engaged and take ownership of the project. You also need to manage assumptions and judgements during the brainstorming session. Keep in mind that managing confronting points of views and objectives with all stakeholders and identifying barriers is a time-intensive process.
- Time to convince the main partner.
- Time to prepare the workshops:
    - Define the stakeholders
    - Build and share a common definition of the problematic
    - Plan the logistics
- Time to exchange formally and informally (The average timeframe between the first meeting and the first workshop with all stakeholders is eight months).
- Not enough time to understand the roots of the challenge

Starting from technology or data

The work of your Living Lab has to start from the user's needs. For this, a data collection process is essential: interview users and organise workshops to co-design the solution.

No definition of a governance model

Your Living Lab should provide decision-making opportunities to all stakeholders. Involve from the beginning a representative from each stakeholder group to form your governance model and choose the most appropriate legal form (i.e. integrated in an association, a charity, cooperative ...). Your model should mirror a circle of mediators where there are no dominating voices. All stakeholders are providers.

Legal and data protection issues

The Living Lab needs to consider ethical and legal issues, such as data protection and privacy. The Living Lab should have a Data Protection Officer who oversees the data protection strategy and ensures compliance with the General Data Protection Regulation 2016/679 (GDPR).
If you cannot guarantee data protection of your stakeholders, you will lose the trust of the panel.

Stakeholders' expectations

- Understand the barriers but never make promises.
- Understand user's expectations about your innovation.

No focus: addressing "everyone"

Make sure your Living Lab addresses specific user segments, target groups have to be well defined in order to properly address user needs.

Design disciplinary "silos"

- Involve an interdisciplinary team in the whole service design methodology:
  - Fieldwork
  - Script (Customer Journey, Service Blueprint, etc.)
  - Staging (Prototype, theatre-based re-enactment etc.)
  - Production
- Your team should not be specialised in a single function, but interdisciplinary by design.

Forgetting the role of the context

- Where are you based, define your context.
- The service or product you are designing is part of a customer journey (contextualisation)

Involving citizens at the end

Citizens should be involved in the different phases of your innovation process. In most cases, they don't need to be paid for their contribution, but rather the work should focus on motivation and keeping them informed on how their contributions are integrated in the project. Ultimately, the work of the Living Lab is addressing a societal challenge that citizens will benefit from.

LIVING LAB STRUGGLES -
HOW TO MANAGE THE DROP-OUT RATE

The participants' motivations to be involve in the Living Lab field test at the beginning of the project are usually higher than once the activity is underway. The motivations and expectations can also change over time.

The participants who voluntarily participate in the living lab field tests tend to drop-out from user studies before the project or activity has ended.

What is drop-out in Living Lab field tests?
"A drop-out during a living lab field test is when someone who signed up to participate in the field test, does not complete all the assigned tasks within the specified deadline"

Definition of field test
To test (a procedure, a product, etc.) in actual situations reflecting intended use. (Merriam-Webster Dictionary, 2018) Experiment, research, or trial conducted under actual use conditions, instead of under controlled conditions in a laboratory.
(BusinessDictionary.com, 2018)

Living Lab field test
A user study in which test users interact with a (digital) innovation in their real-life everyday use context while testing and evaluating it.
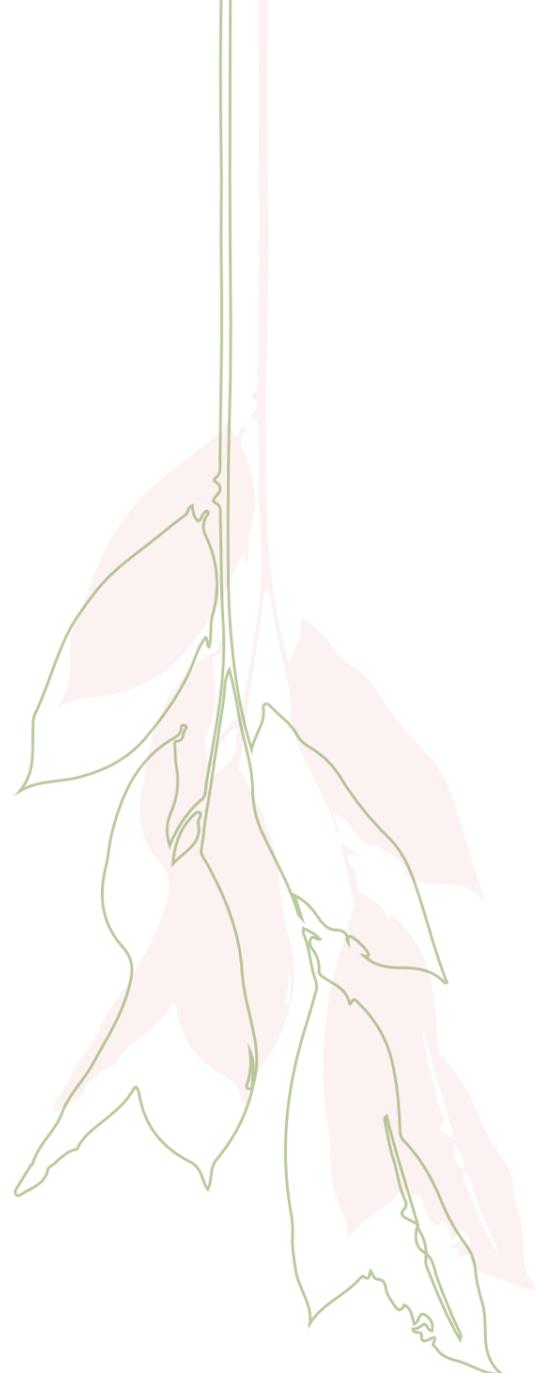
Drop-outs can be due to several factors:
• Innovation-related (participants might have technological problems, do not perceive the innovation useful or too difficult to use)
• Participant-related (because of the everyday context, participants' attitude or their resources)
• Process-related (because of a task design, interaction or timing)

If we look closer in the issues that were reported during the field tests by Botnia Living Lab we see a multitude of reasons why participants dropped out. Table 1 is created from examples of a field test where a digital innovation was developed. This example can be used when implementing nature-based solutions or other types of innovations.

Table 1 Drop-out reasons in field tests

INNOVATION-RELATED FACTORS

TECHNOLOGICAL PROBLEMS	PERCEIVED USEFULNESS	PERCEIVED EASE OF USE
I had trouble installing the innovation	There were no benefits for me in the innovation	The innovation was not easy to understand
There were problems with compatibility of the infrastructure	The innovation did not meet my needs	The innovation did not meet my expectations
The innovation was technologically too complex	I have no faith in the future of this innovation (I wouldn't use it and don't think others would either)	
The innovation was not stable	The external context made me unable to keep on participating in the test	
The innovation did not meet my technical expectations		

PARTICIPANT-RELATED FACTORS

PARTICIPANTS' ATTITUDES	PERSONAL CONTEXT	PARTICIPANTS' RESOURCES
I forgot to test	My personal context made me unable to keep on participating in the test	I didn't have enough time to be involved in this project
I did not want to install something new on my device		I had to consume my own internet data quota
The innovation was not reliable		I had to consume my own resources (such as battery power)
The innovation did not stimulate my curiosity		I had to use my own device
The feeling of novelty association with the innovation quickly disappeared		

PROCESS-RELATED FACTORS

TASK DESIGN	INTERACTION	TIMING
It was a lengthy project	There was no clear guideline on how to do the tasks	The timing of the project was inappropriate
The tasks during the field test were not accomplished	I was not satisfied with the technical support during my involvement period	I was not able to participate in this project at my own pace
The tasks were not easy to understand	It was unclear what was expected of me during the field test	
I couldn't test where and when I wanted	I was not able to keep track of the project status over time	
	There was not enough instant support	
	The guidelines or instructions were not easy to understand	
	I was not satisfied with the way in which I received feedback from the project	
	There was no mutual trust with the organizers of the field test	
	I had not been informed about the project's details before the start of the field test	
	I did not have the feeling that my feedback was important	

RECOMMENDATIONS ON HOW TO KEEP PARTICIPANTS MOTIVATED

1 Spend enough time to investigate the innovation's functionality before engaging citizens in larger scale

2 A clear and on-time communication and interaction with the citizens is necessary

3 Give the citizens the feeling that their contribution is important

4 Manage the citizens' expectation

5 Ensure flexible and appropriate timing of their engagement

6 Avoid to prolong the engagement activities and divide the task into micro tasks where applicable

7 Consider **an appropriate financial reward or a small gift** for their engagement

8 And finally, do not forget to receive the consent of the participants and think about ethical interaction

07.

URBAN LIVING LAB FRAMEWORK TOOLKIT – DEVELOP YOUR URBAN LIVING LAB

With the use of this Framework Toolkit, you will broaden your knowledge on Urban Living Lab framework and its key components and at the same time to discover influential factors on setting up and running an Urban Living Lab. You will be able to answer questions such as who should be engaged and how, what methods should be applied to engage citizens, who starts the process, who is responsible to run the experimentation process, and how the governance model of an Urban Living Lab should be structured.

Main Cards
- Seven decks of cards, each deck represents one key component of ULL framework.
- Barrier and stop cards.
- Empty cards: Each card deck (key component) has 4 empty cards to add specific actions or descriptions if necessary.

Guide Cards (big size cards)
- Seven "Key component guide" cards
- Five "Development phase guide" cards

The overall white background sheet
- You can build your own guide & planning sheet (white background paper) by using "guide cards", "Key Component" and "Development Phase", i.e., the big size cards.

1. Start with an overview of the card decks to be familiar with ULL key components.

3. Start with the guide cards (big size cards): think about different phases of innovation (NBS) development in your city/context (i.e., exploration, creation, implementation, evaluation, and adoption).
- If you are in the setting up a Living Lab phase, you can focus on exploration, creation and implementation phases.
- If you are running a Living Lab, you can focus on implementation, evaluation, and adoption.

5. The cards can be put down anywhere on guide & planning sheet (white background paper) regardless of the deck (key component) that the cards belong to. For example, you can use the card "City planners" under the key stakeholder engagement key component (such as workshops with city planners); or financing & business model key component (such as co-financing with city planners).
Note: you can use empty cards to use the same action under multiple phase (e.g., if you think "risk assessment" should be done in exploration, end evaluation; that is possible).

2. Agree with the other participants at your table on an NBS case (in this case the NBS from a city is chosen). The Urban Living Lab Framework Toolkit then will be used to guide you about what you have done and what you should/can do in order to set up and run your ULL.
Another alternative is to think of different actions that should be undertaken in order to set up and run an ULL. In this case you do not need to focus on a city or a specific example, instead you rely on your own knowledge and experience and develop your own plan accordingly.

4. Put down the relevant key component guide cards under each phase (up to three key components) and build your own guide & planning sheet on white background paper.

6. You can always write down on the white background planning sheet (white background paper) if you need to clarify/add any information. For example, in ICT infrastructure deck you have description card "software" and here you can write down the specific tool/software that you use, and so on.

7. You can always relate the cards together and write down additional information on guide & planning sheet. For example, you can use the card "private sectors" and the card "Brainstorming" and add some additional information on the background sheet if you want to.

9. The cards provide you critical clues and enable you to:
- Write down on empty cards depending on your specific context.
- Write down on the guide & planning sheet depending on your specific context.

11. If you think there is another overarching key component or development phase in your context, you can add it to empty guide cards (key components or development phase), and build your own scenario using the main cards.

General tip: Try to find a connection between the development phase (i.e., exploration, design, etc.) and the key component (i.e., key stakeholders, NBS, etc.). Use relevant cards or write down what is relevant in your context (e.g., what actions are done in designing NBS, what description is important, etc.).

8. The barrier and stop cards can be used in the process, where an obstacle for any action needs to be predicted or identified (e.g., the stop card can be used if the municipality is not interested to invest on ULL implementation anymore; or a barrier might be lack of citizens motivations to be engaged in the NBS development process)

10. You don't have to use all the cards, just pick the ones that are relevant or make sense.

Key component cards:
The seven key components of the toolkit are:
- governance and management structure;
- financing models;
- urban context;
- nature-based solutions;
- partners and users (including citizens);
- approach;
- ICT and infrastructure.

Key Development Phases Cards:
- exploration,
- co-creation,
- implementation
- test and evaluation
- adoption of NBS

Main Cards for Financing and Business Models:
- resource allocation
- revenue stream
- crowdfunding
- maintenance plan
- financers
- cost structure

FINANCING & BUSINESS MODELS
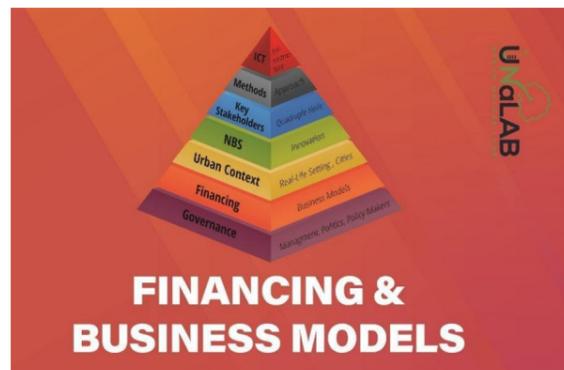
Main Cards for Governance and Management:
- risk management
- local government
- risk assessment
- city planners
- knowledge sharing
- dissemination activities

Main Cards for ICT infrastructure cards:
- hardware
- software
- ICT consultant
- IT manager
- Networks
- Data

Key stakeholders cards:
- Stakeholders identification
- Citizens
- Discover stakeholders needs
- Public sectors
- Motivating stakeholders
- Private sectors
- Stakeholders dialogue and contacting
- Knowledge institutes
- Stakeholders identification
- NGOs

GOVERNANCE AND MANAGMENT

ICT INFRASTRUCTURE

KEY STAKEHOLDERS
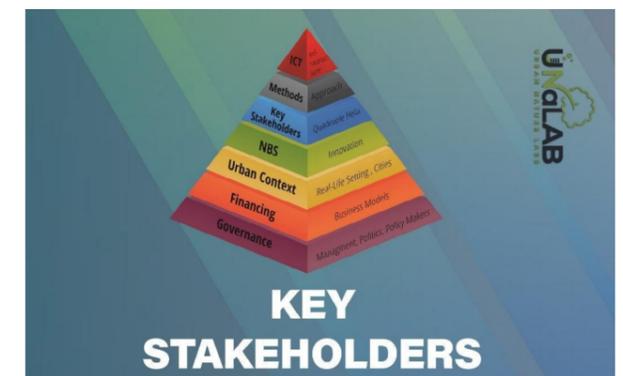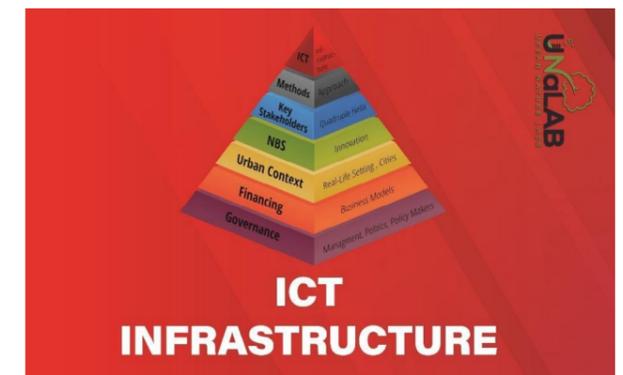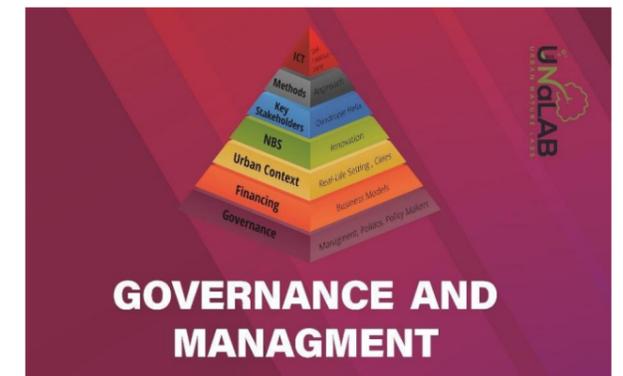
Approach and Methods cards:

- Brainstorming
- Supportive tools
- Co-creation activities
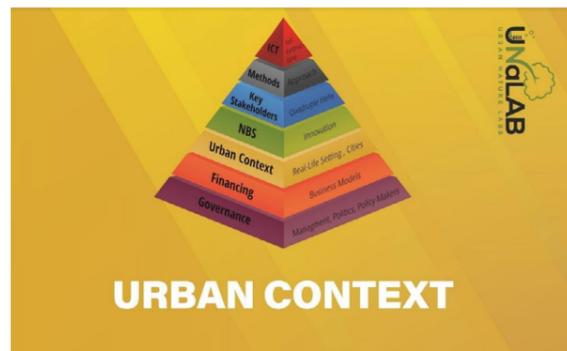- Workshops
- Training sessions
- Interview / survey
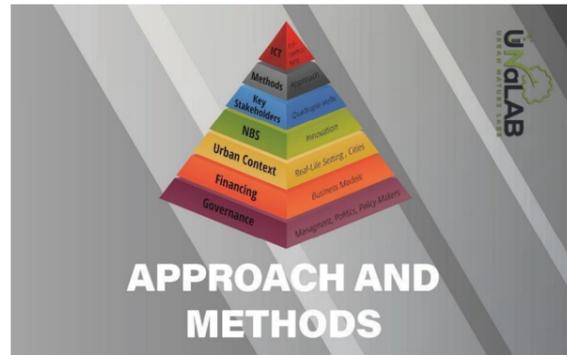
Nature-based solution cards:

- Defining the aim of NBS
- Value co-creation
- NBS setting

Urban Context cards:

- Physical infrastructure
- Context ownership
- District
- Street
- Whole city
- Park
- Physical security
- Future plans

Barrier / stop cards on which you can write

08.

ACRONYMS AND TERMS ●

ABBREVIATION

URBAN LIVING LAB	**ULL**
URBAN NATURE LABS	**UNaLab**
NATURE BASED SOLUTION	**NBS**
INFORMATION AND COMMUNICATIONS TECHNOLOGY	**ICT**

09.

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