Co-creation Workshops Report

D2.2 Deliverable

31/05/19

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About UNaLab

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 (NL), Genova (IT) and Tampere (FI) – has a strong commitment to smart, citizen-driven solutions for sustainable urban development. The establishment of Urban Living Lab (ULL) innovation spaces in Eindhoven, Genova and Tampere supports 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. The Front-Runner Cities actively promote knowledge- and capacity-building in the use of NBS to enhance urban climate and water resilience within a network of committed partner cities, including seven Follower Cities – Stavanger, Prague, Castellón, Cannes, Başakşehir, Hong Kong and Buenos Aires – and the Observers, Guangzhou and the Brazilian Network of Smart Cities. Collaborative knowledge production among this wide network of cities enables UNaLab project results to reflect diverse urban socio-economic realities, along with differences in the size and density of urban populations, local ecosystem characteristics and climate conditions. Evidence of NBS effectiveness to combat the negative impacts of climate change and urbanisation will be captured through a comprehensive monitoring and impact assessment framework. Further replication and up-scaling of NBS is supported by development of an ULL model and associated tools tailored to the co-creation of NBS to address climate- and water-related challenges, a range of applicable business and financing models, as well as governance-related structures and processes to support NBS uptake. The results of the project will be a robust evidence base and go-to-market environment for innovative, replicable, and locally-attuned NBS.

Partners

innovation programme under Grant Agreement No. 730052
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EXECUTIVE SUMMARY

This is a report of the co-creation workshops about NBS, organised in the Spring of 2018, in the UNaLab front runner cities Tampere (Finland), Eindhoven (The Netherlands) and Genova (Italy). These three cities have all organised series of co-creation workshops to work on the exploration and implementation of NBS, as a starting point for the Living Labs they will develop on their UNaLab project locations. The approaches the cities had for their co-creation workshops were quite different, which resulted in a mix of chosen techniques, participants and results. The differences in approach mostly derived from the fact that the UNaLab test locations for the cities had their own scale, character and nature as well as the cultural and organizational differences. In general, the goals of the workshops were similar, and they were met in the realisation. The setup was also similar: first workshops were aimed at familiarizing with the subject, sharing views. In the second step, the participants worked mostly on creating solutions that were tested in the third and final workshop.

Organising the workshop was an interesting learning experience for the cities, both to explore the subject of NBS and to work with chosen techniques. The impact from the workshops was actually rather similar in all cities. The commitment to follow up between and after the workshops was good. All participants have now learned about NBS locally and worked on creating vision. They had a positive experience with co-creation in city development. In all cities, involvement was satisfactory for the organizing cities. Feedback from the participants in all three cities was quite positive as well.

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1. INTRODUCTION

1.1 Purpose and target group

This is a report of the co-creation workshops about NBS, organised in the Spring of 2018, in the UNaLab front runner cities Tampere (TRE; Finland), Eindhoven (EIN; The Netherlands) and Genova (GEN; Italy). These three cities have all organised series of co-creation workshops to work on the exploration and implementation of NBS, as a starting point for the Living Labs they will develop on their UNaLab project locations.

For the follower cities in UNaLab, but also for any other city, this should be a report that helps cities set up their own co-creation workshops about NBS. It provides information about co-creation in general as a theoretical background. It also provides information about the choice of method for the workshop, the setup and the participants. It tells the story of what actually happened, compared to what was planned to happen. What went well? What went off track? The information about the workshops is further analysed to find out what general lessons can be learned from the workshops, about co-creation and NBS. In general, the report gives tips and tricks for anyone who would like to use co-creation in the process of implementing NBS.

1.2 Contributions of partners

Eindhoven has led the task on co-creation workshops and has compiled all the information as well as a framework for this deliverable. Most of the information on the workshops was provided by the surveys that were collected before and after the workshops in EIN, GEN and TRE by ENoLL. Additional information was provided by the other front runner cities GEN and TRE. LTU had an important role in providing the report with a theoretic/scientific background. Eindhoven did the final revisions of the report.

1.3 Relations to other activities

Task 2.1, Co-creation Training and Workshops in Front-Runner Cities is related to the other tasks in UNaLab in different ways: other tasks provided information for task 2.1; while the task outputs information that can be used in other tasks and work packages.

This deliverable 2.2 is linked to other activities within the workpackage 2. In task 2.2 about the UNaLab Living Lab Framework & Principles, the two co-creation methodologies are presented. The aim of the task 2.3, UNaLab Living Lab Methods & Tools, is to develop resources to support the development of ULLs for NBS, to establish collaborative co-creation and experimentation methods through the development of training materials, methods and tools. Naturally, the methods and techniques used in the city workshops will be incorporated. The co-creation workshops have also provided important insights to T2.4 Urban Living Lab Training Programme, highlighting topics important to focus on in ULL trainings and webinars. And the task 2.5, Implementation & Adoption barriers analysis, can build on the experience from the workshops, the development of ULLs and the building of Communities of Practice.

This task is also connected to other work packages. In the workshops, examples of the 'Inspiration Booklet' were very useful for exploring the subject of NBS and the implementation of solutions. The results of the workshops regarding the implementation of NBS will be useful for the deliverable D6.8, Handbook to support NBS implementation. There is also a close

connection to WP7, Dissemination, Communication and Exploitation, as the co-creation workshops have to be disseminated and this deliverable will serve as a repository of information on the workshops for the dissemination partners.

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2. THEORETIC / SCIENTIFIC BACKGROUND

In this section, a theoretical background providing a basis for this deliverable is presented. The section starts by introducing Urban Living Labs (ULLs), followed by different co-creation methods and techniques in Living Labs. The section ends by briefly exploring the design thinking concept as a process to develop solutions to complex and ill-defined problems.

2.1 Urban Living Lab

Nowadays, cities are facing several challenges because of increasing urban complexity and grand societal challenges. Hence, there is a growing trend to make urban areas more suitable to the citizens' needs by preventing social problems as well as viewing the cities as a vehicle for innovation in urban planning processes (Juujärvi & Pesso, 2013; Scholl & Kemp, 2016). To overcome these issues, the decision makers and other relevant stakeholders aim to develop the city as a laboratory to generate innovative solutions by considering the whole urban areas in the city as places for their living laboratory (Juujärvi & Pesso, 2013), an approach that is in line with the "living lab" concept.

Living labs are generally known as a way to manage innovation processes in an open, inclusive and collaborative approach in which the innovations are developed by engaging various stakeholders including public organizations, private sectors, universities and citizens (Bergvall-Kareborn & Stahlbrost, 2009). Thus, it is important to include external sources of knowledge and ideas within the innovation process, which is consistent with the notion of "open innovation", a term that was first coined by Chesbrough (2003) and is the core of the living lab concept.

Although there are many studies that have discussed the living lab concept at the general level, few of them have investigated the living lab concept when the whole city or urban area has been considered as the context for the living lab, which is called an urban living lab (ULL) (Baccarne, Mechant, Schuurman, Colpaert, & De Marez, 2014; Chronéer, Ståhlbröst, & Habibipour, 2018; Steen & van Bueren, 2017).

Within the UNaLab project, innovative nature-based solutions (NBS) that aim to develop smarter, more inclusive, more resilient and increasingly sustainable societies are of crucial importance. Accordingly, in this deliverable the most appropriate definition for ULL would be: "a local place for innovative nature-based solutions that aims to solve urban challenges and contribute to long-term sustainability by actively and openly co-constructing solutions with citizens and other stakeholders" (Chronéer et al., 2018, p. 10). In this regard, the whole city can be seen as a living laboratory in which citizens and other stakeholders will actively be involved in the process of designing, developing, implementing, testing and evaluating the innovation (Veeckman, 2015).

Within an ULL, it is important to include all stakeholders that can contribute to the innovation development process. The key stakeholders in an ULL are public actors, private actors, knowledge institutions and users (citizens). Figure 1 shows an overview of the key stakeholders in an ULL.

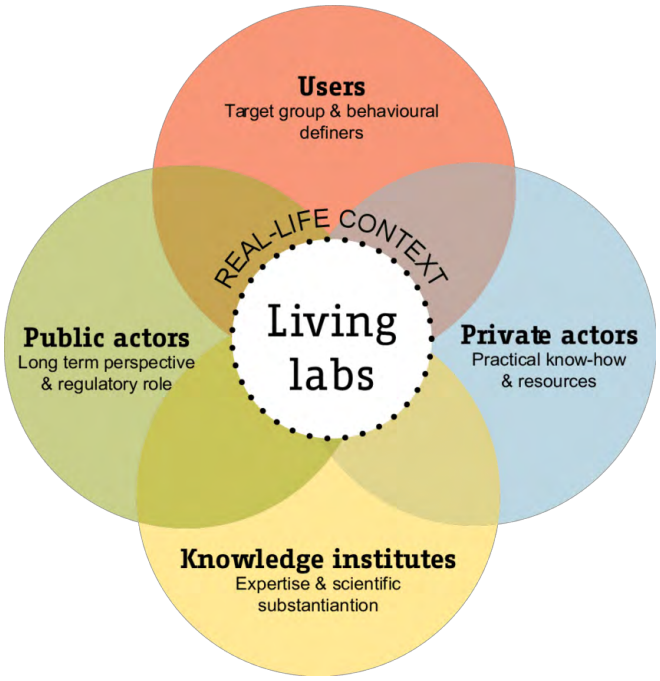

Figure 1: Urban living labs: a living lab way of working (van Bueren, E.M., 2017)

Regarding the definition of key elements of an ULL, by assessing 90 sustainable urban innovation projects in the city of Amsterdam, Steen and van Bueren (2017) identified four key characteristics of an ULL, namely: aim, activities, participants, and context. They also argued that excluding one or some of these basic components of living labs might lead to disappointing performance in the whole innovation development process. According to this study, the aims of an ULL are innovation, and formal learning. The main activities are innovation development, co-creation and iteration of the design and development process by considering feedback from the previous steps. When it comes to participants, public and private sectors, citizens and knowledge institutions are of vital importance and finally, the context is always real-life everyday use.

Juujärvi and Pesso (2013) have identified three main types of ULLs when it comes to level of engagement in the process. In the first type, the urban context can act as a technology-assisted research environment by collecting as much citizen feedback as possible using different sensors and IoT deployments. In the second type, citizens can also be co-creators who contribute to designing and developing local services and urban artefacts (e.g., communal yards, day-care services, etc,). The third type of ULL is when new kinds of urban planning using new processes and tools are developed by actively engaging citizens. In this type, the objective is to plan procedures and facilitate vision planning which will lead to increased mutual learning of various stakeholders, including citizens.

Considering the development of NBS in the UNaLab project, in the first type of ULL, the citizens are not actively engaged in the process of innovation development; however, they are still somehow involved in the process. In the second type, the citizens participate in the process and their ideas are taken into account. The more flexible and inclusive approach to develop NBS is the third type in which the citizens as well as other stakeholders can influence the whole process with the power of decision making.

Veeckman and Shenja (2015) identified three main benefits of viewing the city as an ULL which are: (1) ULL facilitates citizen participation and collaboration; (2) ULL facilitates co-

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creation processes in the city, and (3) the ULL approach empowers citizens. They also suggested that by using different tools and techniques, citizens who do not have very high technical skills are also able to participate in the progress of their cities, and to the development of different solutions that are beneficial for their city as well as their everyday urban life.

Steen and van Bueren (2017), identified five main innovation-related activities in ULLs namely: (1) research, (2) development, (3) testing, (4) implementation, and (5) commercialization. They then classified 90 potential living lab projects in the Amsterdam region under these five themes (see Figure 1). Their findings showed that development of an innovation is the most frequent innovation process phase in the ULL. Steen and van Bueren (2017) argue that only projects that conduct development activities can be considered a living lab project, despite the fact that all of these 90 projects in Amsterdam labelled themselves "living lab" projects. Accordingly, in an ULL context, the innovation must be developed in the city by including relevant stakeholders and citizens and testing or implementing an innovation would be a complementary phase.

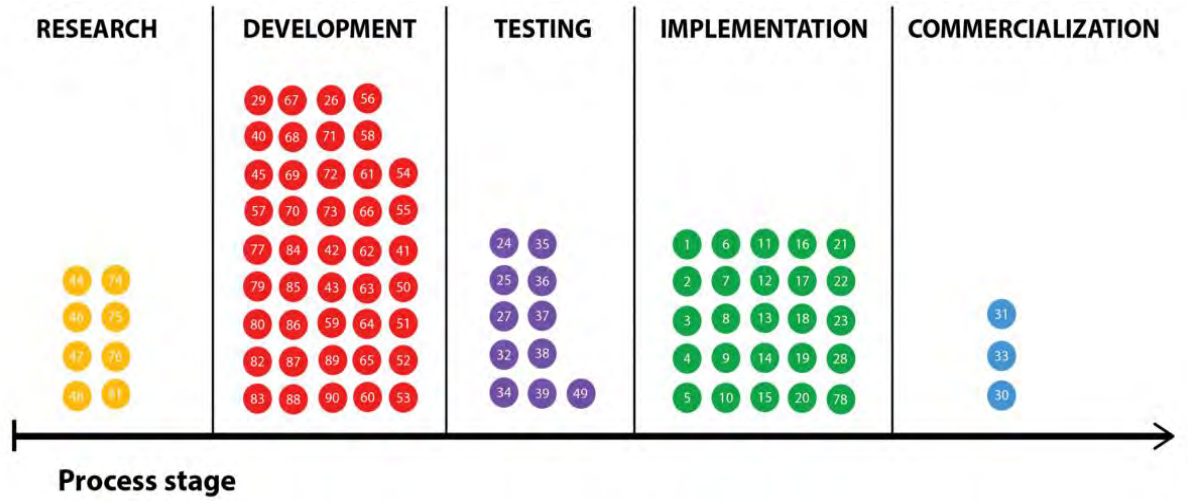

Figure 2: Classification of innovation process phase of 90 potential living lab projects in the Amsterdam region (Steen & van Bueren, 2017)

In order to assesses the role of urban experiments for local planning processes, Scholl and Kemp (2016) conducted a case-based analysis of the city of Maastricht and identified five key characteristics of ULLs (which they labelled "city lab") as a distinct analytical category for looking at urban labs and urban experiments from a planning perspective. First, city labs are hybrid organizational forms purposefully positioned at the border of local administration and society. Second, city labs are places of experimental learning and are learning environments for new forms of governance. Third characteristic is that city labs are multi-stakeholder settings including the local administration and focus on co-creation. Fourth, city labs use co-creation in conducting experiments. And fifth, city labs approach complex problems in a multi-disciplinary way, by drawing on knowledge from different disciplines. In the next section, the co-creation methods and techniques will be discussed in greater detail.

2.2 Co-creation methods and techniques

Co-creation has been defined as the participation of end-users in the process of developing a product or a service. The core principle of co-creation is engaging people to create valuable experiences together. A central element of the transition to co-creation is the ability to

effectively develop and manage two-way communication. In general, there are three different definitions of the co-creation term according to the perspective of involving, for example, citizens in the process: citizens as co-implementers of public services (they only perform some implementation tasks); citizens as co-designers (they decide how a service should be designed); and, citizens as initiators (they trigger an initiative and the government follows their approach). An example within the context of smart cities and IoT projects, Spagnoli el al. (2019) view co-creation as: "an active flow of information and ideas among five sectors of society: government, academia, business, non-profits and citizens - the Quintuple Helix - which allows for participation, engagement, and empowerment in, developing policy, creating programs, improving services and tackling systemic change with each dimension of society represented from the beginning".

There exist different methods and techniques related to co-creation which can be used in different phases of the design process: discover opportunities, generate concepts and ideas, and methods for design. Examples of methods include future workshops, prototyping, surveys, testing, evaluation and validation. A multitude of techniques is used, e.g., personas, scenarios, mockups, image boarding, interviews, focus groups, questionnaires, diaries, observations and thinking aloud (Svensson et al., 2010). A categorization of primary, secondary and tertiary users can provide valuable guidance on how to compose different groups of users for activities (Figure 3). It can also be used as help to interpret and understand conflicting opinions between different users (Svensson et al., 2010).

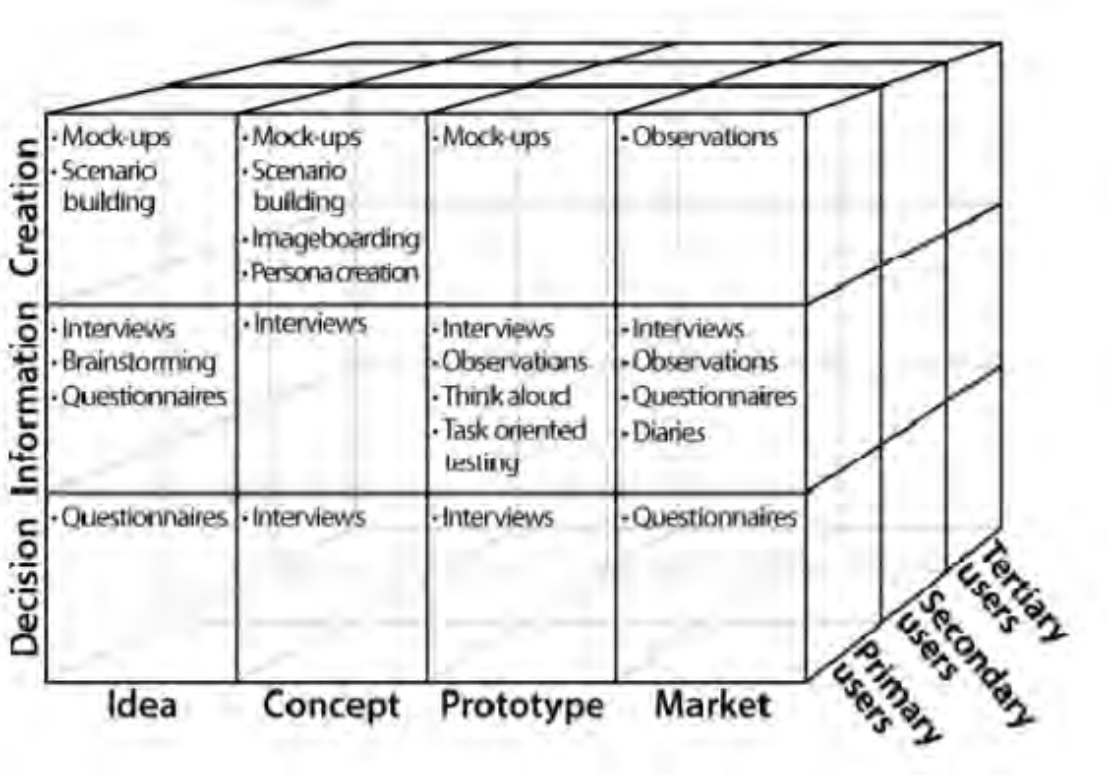

Figure 3. Modified Customer Integration Cube (CIC) with suggested techniques for user contribution.

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Some of these methods are described below.

Discover opportunities

The aim is to gain insight into the different basic needs that different stakeholders have of the service. It is important to start by determining the target user group for the 'discover needs' phase. Here the aim should be to find established groups due to the difficulty of finding time and place for the interview. Aim for at least three groups consisting of four to seven users.

Contextual Inquiry or Contextual Design: This method was formulated in the 1980's as a part of the systems development philosophy called contextual design. This method is described as a collection of principles and techniques, founded on the perspective that systems development should have its starting point in the future users work tasks but with the purpose to enrich it through the new possibilities the technology can offer (Beyer &Holtzblatt, 1999). Contextual Inquiry consist of a combination of interviews and observations where the purpose is to gain as rich picture of the actual work situation as possible with their roles, areas of responsibilities, problems related to the work and the existing tools and so forth.

Why-Why-Why: To sustain a broad perspective throughout the investigation it is important to question and exceed the apprehension about the defined "problem" that already exists in the design situation. One way to do this is to ask a number of "why" questions and by that means build a chain of relations backwards from the original formulation.

Cultural probe: A design-led approach to understanding users that stresses empathy and engagement. Probes are collection of evocative tasks aiming to elicit inspirational responses from people – not comprehensive information about them (Gaver et al., 2004). The aim is to get fragmented clues about the peoples' lives and thoughts.

Dialog café: This has the purpose to create a common dialog, to exchange experiences and knowledge, to highlight the common knowledge and to enrich the fellowship. This process is carried out in small conversation groups around round tables exploring a question or a specific theme. At certain points in time, the participants change groups. This method is suitable when sharing experiences or discussing a question with the aim to increase the individual knowledge sought. In addition, it is suitable when similarities and differences in opinion needs to be highlighted or when different perspectives on an issue are desired (www.theworldcafe.com).

Generate concepts and ideas

Different stakeholders can be involved in generating ideas for new solutions using workshops, 'walkshops', brainstorming and idea competitions. These methods can also be applied in other stages of the process, e.g., during evaluation of developed solutions. The generated ideas and further developed solutions can be concretized in various ways so that it is easier for residents and other stakeholders to understand them in a similar way and evaluate their suitability. Scenarios are textual stories of possible futures. They can be either text or visual narratives. Plus and minus scenarios can be used to illustrate the possible positive and negative effects of the planned changes in an exaggerated form.

Future Workshops: Workshops can be used for different purposes where stakeholders' input is required. The purpose of these groups is to gather different kinds of groups around a joint subject or matter or to find a subject to gather around and work more with. Workshops can be implemented, e.g., using rotation table or open space techniques presented below. Workshops

can also be arranged online, e.g., via Facebook, where the participants are guided to answer certain topics weekly. The result should be concrete action plans that are implemented in their own context (Reyes & Finken, 2012). The original idea of a futures workshop is to bring together people from various backgrounds who all share an interest in a common issue or a problem. The aim was to increase people's participation in solving collective problems by giving them an opportunity to influence future decisions of an issue whose development might otherwise be defined solely by traditional decision makers such as politicians, civil servants or experts (Lauttamäki, 2014). A variant, walkshop, is a workshop that is implemented by walking in the context and doing pre-formulated tasks (Korn & Zander, 2010; Spier, 2013). One person is a facilitator and another one takes notes, e.g., by recording video. The participants can also be asked to record their findings themselves, e.g., using a camera. After the walkshop, the participants still gather together to summarise their experiences, findings and ideas.

Brainstorming: This can be used for generating a lot of new ideas in a short time. Brainstorming is a method for generating ideas to solve a design problem in a systematic way. It is a creative activity where people produce as many ideas possible for later analysis, and under the direction of a facilitator. The tone of the session is open to the inscription and tolerant. Brainstorming serves to promote a culture of building on the ideas of others generated from multiples perspectives and levels of expertise. Using brainstorming and collages provides the participants to translate their experiences. Because brainstorming fosters a 'free-thinking' environment, the session will help promote radical new ideas which break free from normal ways of thinking. The strength of brainstorming is the potential participants have in drawing associations between their ideas in their environment, thereby broadening the solution space. The participants are told to lose their inhibitions and that no ideas will be judged so that people are free to shout out any ideas at all without feeling uncomfortable. People should build on the ideas called out by other participants (Ali & Liem, 2015).

6-3-5 Brain-writing: This is a more structured form of brainstorming. It is especially useful with a group of people who are somewhat quiet and would be unlikely to offer many ideas in an open group session such as brainstorming. 6-3-5 Brain-writing (also known as the 6-3-5 method or Method 635) is a group creativity technique. Each participant thinks up to 3 ideas every 5 minutes. These ideas are written down on a paper and passed on to the next participant. The participant reads the ideas and uses them as inspiration for more ideas. Participants are encouraged to draw on others' ideas for inspiration, thus stimulating the creative process. After 6 rounds in 30 minutes the group has thought up a total of 108 ideas. In comparison to brainstorming, brain-writing can minimize the effect of status differentials, dysfunctional interpersonal conflicts, domination by one or two group members, pressure to conform to group norms, and digressions from the focal topic. It might also eliminate production blocking, reduce social loafing, and encourage careful processing of shared ideas (Litcanu, Prostean, Oros, & Mnerie, 2015).

Experience Prototyping: This is research through design and learning through practice, a methodology for designing with context in mind. Experience prototyping is valuable when designing a service that adapts to the situation the participants are in. Experience Prototyping is less a set of techniques than it is an attitude, allowing the designer to think of the design problem in terms of designing an integrated experience, rather than one or more specific artifacts. Therefore, an Experience Prototype is any kind of representation, in any medium, that is designed to understand, explore or communicate what it might be like to engage with the product, space or system being designed (Buchena & Suri, 2000).

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Innovation by Boundary Shifting: To form, or enrich, an operative image of a future solution, a movement outside the problem delimitations can be required (Löwgren & Stolterman, 2004). This method consists of four stages:

1. Identify the necessary functions that a system must have to fulfil the desirable objective.
2. Identify conflicts between the current way to bring about the necessary functions within the suggested problem delimitations.
3. Identify resources outside the suggested problem delimitations that could be used to transform the problem.
4. Search for functioning sub-solutions to the problem that could make it possible to use the new resources.

Methods for design

Rapid prototyping: Interactive prototypes are developed which can be quickly replaced or changed in line with design feedback. This feedback may be derived from colleagues or users as they work with the prototype to accomplish set tasks. This method is concerned with developing different proposed concepts through software or hardware prototypes and evaluating them.

Techniques for Detailed Shaping

Within interaction design, there are several techniques that can be used to illustrate and transfer users' needs in a co-creation activity. In the following, a short description of a few of these techniques are described.

Scenarios: These are descriptions of possible futures that reflect different perspectives on the past, the present and the future. They play a role in distinguishing needs; supporting knowledge; integration; adaptation; cross-disciplinary issues and detection of early warning signals provoking strategic revisions. The scenario should be as detailed and personal as possible and by that means making it possible to force yourself to ask and answer questions about the future users. Developing scenarios is a technique that supports building coherent visions and therefore helps anchoring these visions. They help overcome the limited rationality of decision makers and contribute to common representation and a common language (Kokkinakos et al., 2012).

Mock-Ups: Experimenting with mock-ups is a very efficient technique for visualising and simulating selected elements of envisioned information technology (IT) systems prior to their implementation. A user interface mock-up is a drawing of how the future systems user interface is meant to be designed and you are forced to handle detailed questions about interaction techniques and graphic form compared to using scenarios. A user interface sketch can be used to communicate, develop and establish the design visions (Sharp et al., 2007). Mock-ups are light weight prototypes that illustrate certain aspects of the solution as a tangible object. They are mostly used when developing tangible products, but they can be also used for concretizing specific details of a service.

Storyboards: These have very broad appeal since they are easy to apply, because they bring together many different aspects of story, character, problems and resolutions, all in a familiar format of images and words, to make even complex ideas much clearer. When participants need to tell detailed experiences storyboards provide an easy framework to help participants be specific about relating an experience, including expectations, decisions and feelings, rather than vague commentary. Storyboards tell a visual story of a planned service or solution, e.g., in a form of a comic. Films are a further developed form of storyboards. They can be used especially for evaluating solutions online. Another way to think about storyboards is to create visual narratives. This means to create a story, based on user expressions and the system being designed, that reveals how the future system will be used when it is implemented in its context.

The visual narrative can be expressed as a series strip, but it can also be a short film showing the future use situation. Visual narratives are especially useful in situations where rich user data has been collected.

Personas: A persona is a fictitious user described with basis in data. The personas method is recognized in IT development within the private sector but has spread to other areas such as marketing and product development. The work with personas is about using the everyday experiences of the users and their needs as a starting point when developing new products. The persona method does not include real users but instead representations of the users. This leads to inclusion of the users' perspective in all aspects of the design process (Nielsen, 2011).

Design games: These have been widely used in service co-design to structure the design dialogues between stakeholder groups and service designers in probing, imagining and prototyping services. In service co-design, design games have been used in various roles such as studying particular design environments, building design competences, empowering future users, and engaging multiple stakeholders (Vaajakallio, 2014). Design games provide a stage and tools for people to share current and past experiences in order to envision future ones. Four core functions are proposed by Vaajakallio and Mattelmäki (2014, p. 66) that exist in most design games "(1) creating a common design language; (2) promoting a creative and explorative attitude; (3) facilitating the players in envisioning and enacting 'what could be'; and (4) helping to define the roles of participants in the interaction during a session".

Field tests: These are used to test new services or solutions in the real world context of people's everyday life. The test participants get access to the new solution for a certain period of time, during which they report about their experiences. The feedback can be collected afterwards with interviews, questionnaires or focus group discussions. Another option is that the test participants report their experiences and new ideas during the test period in an online discussion in which the developers also participate (Svensson et al., 2010).

The following table summarizes prominent tools and methods of co-creation that are described in literature.

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Table 1: Prominent Methods Used in Co-Creation (Hribernik et al., 2011).

Method	Description
Role play	Actors in the design process (users and/or designers) play through a potential use of an imagined service or process.
Storytelling	Use of the product of service is described in simple words as a story, allowing for the communication of ideas and the development of storyboards.
Group sketching	A group of participants develop ideas, services of products by sketching together on a piece of paper or equivalent. GroupSketch is a tool which supports simultaneous drawing virtual paper [Greenberg, Bohnet, 1991]
Card sorting	"Card sorting is a user-centered design method for increasing a system's findability. The process involves sorting a series of cards, each labelled with a piece of content or functionality, into groups that make sense to users or participants." [Spencer, Warfel, 2009]
Character Profiles	By creating fictional character profiles, a team can share knowledge about the users of a product or service.
Rough Prototyping	Rough prototyping is a method of quickly prototyping product or service components "using any available materials" [Gordon 2009] in order to better explain ideas to the team.
Experience Prototyping	Allows for the active engagement of team members, users and clients with a product or service.
Storyboard	A narrative representation of use cases through a series of drawings of pictures to illustrate the use of a product or service and the users' points of contact with it.
Personas	Personas are fictional user archetypes developed in realistic detail. Task scenarios describe how they interact with the design. Together, they form the basis for specifying how users want to experience the product or service. [Long 2009]
User Journey	The customer journey map is an oriented graph that describes the journey of a user by representing the different points of contact that characterize his interaction with the service.
Poster	The Poster simulates a future advert for the product or service. By elaborating it, the designers imagine how the new offering could be launched and perceived by the consumers.
Interaction Table	This is an expansion of the storyboard methods which describes step-by-step interaction with the product or service.
Moodboard	A mood board is a visual composition of pictures and materials that propose an atmosphere by giving the generic perception of it.
Actor Hierarchies	Actor hierarchies use graphs to show an overview of the people who will interact with the product or service.
Lead Users	"Lead users are users whose present strong needs will become general in a market- place months or years in the future. Since lead users are familiar with conditions which lie in the future for most others, they can serve as a need-forecasting laboratory for marketing research." [von Hippel 1986]
Crowdsourcing	"'Crowdsourcing' is the act of taking a task traditionally performed by a designated agent [...] and outsourcing it by making an open call to an undefined but large group of people. [...] Crowdsourcing is to take the principles which have worked for open source software projects and apply them right across the entire spectrum of the business world." [Howe 2008]
Consumer Partnerships	At the very least, consumers are involved in a design process as providers of information. In more intensive consumer partnerships, an organisation will ask consumers to identify goals and objectives and provide the support and advice to accomplish outcomes [Carr 2001].
Serious Games	Serious games are video games which can be applied to stimulate participation and co-operation in the co-creation process.
Ideas Competition	Users are asked to propose innovative ideas within a given timeframe. The ideas are then commented and discussed by all participants. Finally, the submissions are evaluated by an expert panel and a winner selected. This method is often used in an online context, e.g. IBM Innovation Jams [Bjelland, Wood, 2008]

2.3 Design Thinking and Transdisciplinary Methods

Design thinking (DT) is a term coined and popularized by David Kelley that builds upon Schön's (1983) reflective practitioner research. Briefly, DT brings forward and systematizes the mindset and ecosystem in which designers think and develop their ideas (Kelley, 2013). Design thinking deploys the typical design setting for iteratively prototyping ideas. Kelley proposes four phases of DT: inspiration, synthesis, ideation and experimentation, and, finally, implementation (Kelley, 2013). In a workshop setting that is inspired by the DT process, the first phase of inspiration is about challenging the workshop's participants. They are introduced to inspirational and innovative prompts such as projects, trends or weak signals, or results of user studies which set the framework for the tasks. In synthesis, the challenge is formulated as the result of the collaborative thoughts sparked in the first session. Ideation and Experimentation aims at generating as many ideas as possible in a short time, making a selection of ideas that are further developed and tested through quick prototyping. In a workshop setting, this may be simulated by forming groups and swapping ideas between them. Groups may rotate between ideas as an attempt to liberate the participants from their first favourite ideas, making the process more open-ended. Design thinking "rules" such as "think user-centered", "encourage wild ideas", "return to the challenge", "defer judgment", "go for quantity", and "build on the ideas of others" are deployed to orientate participants. At the end of the workshop, all groups present their outcomes. The generated ideas will be discussed in each table and the workshop ends by sharing insights of different tables with the rest of the participants and reflecting on the results from all tables.

In the domain of the built environment, we can inscribe DT within the umbrella of Participatory Design (PD). Participatory design aims at incorporating end-users as full participants in development processes. Originating in the 1970s as part of the Scandinavian workplace democracy movement, early projects were developed with trade unions to incorporate technology in ways that enhanced rather than replaced workers' skills and local knowledge. Mazé (2007) compares PD to user-centered design, which draws on diverse means of studying, analyzing and incorporating user needs into product development. Participatory design focuses on means for opening up design processes, representations, and products to participation by stakeholders with diverse skills and expertise. Similar to "transdisciplinary urbanism" (Rizzo & Galanakis, 2015), mock-ups, games, and enactment, for example, are simple means for anyone to represent, and communicate ideas, regardless of design, technical or even language skills. Through the perception of the built environment, norms based on the experience of built examples are created, making the continuous development either easier or more difficult. These norms usually depend on economic, ecological and social descriptions of energy. In addition, the questioning of norms is actually constructed by the very participants of the design process.

Recently, urban scholars have begun to discuss the growing popularity of transdisciplinary modes of knowledge production in architecture and urban planning, highlighting three major, recurrent elements, i.e., integration between theory and practice, ethical concerns, and the "importance of experimental, designerly modes of inquiry" (Doucet & Janssens, 2011). Transdisciplinary methods such as DT are about the articulations, rather than the relations, between disciplines. Indeed, the exponential growth of both web-based interaction tools, physical sites where knowledge is created, and the recombination of extremely specialized fields in new knowledge entities have facilitated the emergence of a new form of knowledge production that Gibbons et al. (1994) have labelled "Mode 2". Mode 2 of knowledge production is characterized by transdisciplinarity, i.e., working within an evolving and dynamic framework in which empirical and theoretical knowledge are combined and where multiple players (e.g., universities, research agencies, informal agencies, private firms, NGOs, etc.) contribute to the

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creation of such knowledge (Gibbons et al., 1994). Transdisciplinary methods such as DT do not seek to solve the paradoxes generated by the endless dissection of knowledge in smaller disciplinary units. Rather than aiming to the "unity of knowledge" (Ramadier, 2004), by acknowledging the inherent complexity of the subject, transdisciplinarity directs to master the paradoxes.

In Scandinavia, Atelier (Binder et al., 2011) defines participatory design as an approach that attempts to involve end-users in the design process. He characterizes DT similarly to Redström (2008) "use before use." Atelier's "design things" is inspired by Schön's reflective practitioner (Schön 1983) in that it follows an iterative design process through envisioning, prototyping, and experiencing. Through these phases, participants undergo emotional and cognitive experiences and they express themselves by engaging in practical action together, in a group. The inclusion of creativity can take different forms in different participatory approaches used today. Rizzo et al. (2015) explore the practical use of participatory design in co-creating an energy self-powered campus. Art and aesthetics are deployed to humanize the integration of energy into the built environment by referring to the concept of "energy form". The project sought collaboration with end users and stakeholders, to create an energy smart campus where not only energy production but also the development of public space is democratized. The aim was also to explore how art and architecture as somewhat opposed to the successful economic driving forces, in the form of public installations, can work together in the creation of an energy-producing public space. In addition, the installations work as a visualization of energy production and consumption and aim to address and increase awareness of the production of renewable energy and the role energy plays in public space.

3. CHOSEN METHOD FOR WORKSHOPS

The goal of this chapter is to provide an explanation for the chosen method for co-creation in the cities. Each city has chosen the methodology that helped them best to reach the goal of these workshops and that was a good fit for the intended audience.

3.1 Method 1: EASW

The European Awareness Scenario Workshops, or EASW method, was originally used to identify future scenarios for sustainable living. It keeps in mind that sustainability involves a process of transition based on the dissemination of information and awareness raising about the environment. The method raises the challenge of facing the environmental problems of living areas (towns - cities or villages) by their own inhabitants.

The objective of the method is to encourage dialogue and participation of the various components of society; create a balanced relationship between environment, technology and society; and enable sustainable development while respecting the needs and aspirations of members of a local community. The aim is to raise awareness, generate ideas and criteria for further development. With the EASW method participants meet to exchange views, develop a shared vision on the future of their community and propose ideas on how to achieve it, by answering the following questions: How can you solve problems? Should you focus more on technology or organizational solutions? Who is primarily responsible for their solution? Local authorities, citizens or both?

All involved actors participate in roundtable discussions and present their proposals, which are evaluated and reformulated by the same participants. This makes dialogue possible, between all interested parties and local groups. It can also enhance understanding of local conditions or problems and facilitate consensus on proposed solutions (Urban, 2019).

The EASW was chosen as a method for Genova, because the city is mostly at the beginning of the process of getting stakeholders involved and getting them to embrace NBS. Genova is not new to participatory methods, however they found it is very useful to give a structured form to these processes to be able to make a more consolidated methodology and therefore make it easier to replicate in many other cases.

The training that Genova received for the application of this method gave the municipality personnel a good background for the method and was also a good moment of verification of the experiences made in the past. This not only confirmed the path already travelled, but also allowed to refine the techniques of realization of the co-creation to better integrate the action of the city with wishes and opinions of the stakeholders.

3.2 Method 2: Design Thinking

Design Thinking is co-creative and iterative by nature. Design is about changing and improving, now and in the future. It is key to understand the starting point of innovation (current situation), the preferred situation (vision) and the way to get there. This is needed to make a change and start with smaller steps that lead towards your end goal. Design Thinking puts people and their context at the centre. Experiences are influenced by the social, physical and cultural context. Insight in the daily context of those involved enables the creation of solutions that meet people's needs and wishes. The process is iterative. Small interventions make things tangible and enable reasoning towards the unknown. Stakeholders are actively involved in the different steps

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through co-creation. Design tools are applied to visualize insights and create common ground (M. Bielderman, 2018).

Design Thinking is about approaching things differently with a strong user orientation and fast iterations with multidisciplinary teams to solve wicked problems. It is equally applicable to (re)designing products, services, processes, business models, and ecosystems. It inspires radical innovation as a matter of course, and ignites capabilities beyond mere potential (P. Link, 2018).

In Eindhoven and Tampere, many stakeholders and politicians already embraced the concept of NBS, so the choice was to use Design Thinking as their method. Instead of starting at the beginning, more time could be spent in exploring the possibilities of NBS and finding concrete applications. Both cities hired trained facilitators for the workshops.

3.3 Comparison of methods

The methods have some similarities and some differences. The steps they follow are very similar, and so are the stakeholders that can be involved. The EASW takes steps from vision, to idea, to implementation, while the Design Thinking process flows from empathizing and definition, through ideation, to prototyping and testing. In both methods, the groups get together to understand a problem, find solutions, and test them. The stakeholders that can be engaged are in both cases policy makers, technical experts, entrepreneurs/businesspeople, local citizens and designers.

The aim, focus and methodology are different. For EASW, the aim and focus mostly focus on sustainable development, encouraging public debate, creating a balanced relationship between society, technology and environment. Design Thinking processes are aimed more at the identification of the needs of stakeholders and empathizing with the point of view of, for example, citizens. The methodology of EASW contains the exchanging of views in round-table discussions. The starting point for these discussions are reference scenarios. The methodology of Design Thinking is all about creating, learning, observing, all by doing this together. It starts with understanding the needs of end-users.

4. CONTEXT

In this section of the deliverable, the context of this report including geographic, climatic, environmental and demographic information about the cities, the NBS to be implemented in UNaLab context, and finally the cities' respective degree of familiarity with NBS and co-creation are presented.

4.1 City: Geographic, climatic, environmental and demographic context

4.1.1 Tampere

Geographic/demographic context

Tampere has a population of 234,441 with the urban area holding 334,112 people and the metropolitan area, also known as the Tampere sub-region, holding 385,301 inhabitants in an area of 4,970 km^2. Tampere is the second largest urban area and third most-populous individual municipality in Finland, after the cities of Helsinki and Espoo. It's also the most populous Finnish city outside the Greater Helsinki area and a major urban, economic, and cultural hub for Central Finland. Tampere is the largest inland centre in the Nordic countries.

Tampere is wedged between two lakes, Näsijärvi and Pyhäjärvi. Since the two lakes differ in level by 18 m, the rapids linking them, Tammerkoski, have been an important power source throughout history, most recently for generating electricity. Tampere is dubbed the "Manchester of Finland" for its industrial past as the former center of Finnish industry, and this has given rise to its Finnish nickname "Manse" and terms such as "Manserock".

Helsinki is approximately 160 km south of Tampere and can be reached in 1 h 31 min by Pendolino high-speed rail service and 2 h by car. The distance to Turku is roughly the same. Tampere-Pirkkala Airport is Finland's eighth-busiest airport, with over 230,000 passengers in 2017 (Wikipedia, n.d.).

Climatic context

Tampere has a borderline humid continental climate/subarctic climate (Köppen "Dfb" and "Dfc"). Winters are cold and the average temperature from November to March is below 0°C. Summers are mild. On average, the snow season lasts 4–5 months from late November to early April. Considering it being at the subarctic threshold and inland, winters are on average quite mild for the classification, as is the annual mean temperature (Wikipedia, n.d.).

Table 2: Climate data for Tampere. Source: FMI/Wikipedia

Climate data for Tampere (1981–2010, extremes 1900- present)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	8.0 (46.4)	9.4 (48.9)	14.9 (58.8)	24.2 (75.6)	28.4 (83.1)	31.7 (89.1)	33.1 (91.6)	32.1 (89.8)	24.8 (76.6)	18.4 (65.1)	11.1 (52)	9.6 (49.3)	33.1 (91.6)
Average high °C (°F)	−3.4 (25.9)	−3.5 (25.7)	1.2 (34.2)	8.2 (46.8)	15.4 (59.7)	19.5 (67.1)	22.2 (72)	19.9 (67.8)	14.0 (57.2)	7.5 (45.5)	1.5 (34.7)	−1.9 (28.6)	8.4 (47.1)
Daily mean °C (°F)	−6.4 (20.5)	−6.9 (19.6)	−2.8 (27)	3.3 (37.9)	9.7 (49.5)	14.1 (57.4)	16.9 (62.4)	15.0 (59)	9.8 (49.6)	4.6 (40.3)	−0.6 (30.9)	−4.5 (23.9)	4.4 (39.9)

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Average low °C (°F)	−9.7 (14.5)	−10.6 (12.9)	−6.6 (20.1)	−1.3 (29.7)	3.8 (38.8)	8.6 (47.5)	11.7 (53.1)	10.4 (50.7)	5.9 (42.6)	1.9 (35.4)	−3.0 (26.6)	−7.6 (18.3)	0.3 (32.5)
Record low °C (°F)	−37.0 (−34.6)	−36.8 (−34.2)	−29.6 (−21.3)	−19.6 (−3.3)	−7.3 (18.9)	−2.8 (27)	1.8 (35.2)	−0.4 (31.3)	−6.7 (19.9)	−14.8 (5.4)	−22.5 (−8.5)	−34.2 (−29.6)	−37.0 (−34.6)
Average precipitation mm (inches)	41 (1.61)	29 (1.14)	31 (1.22)	32 (1.26)	41 (1.61)	66 (2.6)	75 (2.95)	72 (2.83)	58 (2.28)	60 (2.36)	51 (2.01)	42 (1.65)	598 (23.54)
Average precipitation days (≥ 0.1 mm)	22	18	16	12	12	13	15	15	14	17	21	22	197
Average relative humidity (%)	90	87	82	70	63	66	69	76	82	87	91	92	80

Source: FMI climatological normals for Finland 1981-2010

Environmental characteristics

Tampere's city centre is surrounded by lake and ridge scenery, sited on an isthmus between lakes Pyhäjärvi and Näsijärvi. The Tammerkoski rapids run through the city. Pyynikki, which was formed by the action of ice and sea more than 10,000 years ago, is the world's highest gravel ridge. At its highest it rises 80 m above Lake Pyhäjärvi and 160 m above sea level. Soil in Tampere is mainly moraine.

There are 200 lakes and ponds in Tampere, and a total of 450 in the entire region. Water quality in lakes and rivers have improved over the long term. Overall state of lakes in Tampere is mainly good or satisfactory. There are 29 public beaches in Tampere. Twenty-four per cent of Tampere's surface area is water and 76% is land. Nearly 20% of the land has a town plan. All (100%) of urban wastewater is treated in four wastewater treatment plants. Seventy-five per cent of the city's wastewater is processed at Viinikanlahti. The second-largest wastewater treatment plant is Rahola. Building of a new central wastewater treatment plant inside the Sulkavuori hill has started.

There are numerous nature reserves in Tampere. Pyynikki and Viikinsaari near the city centre are the best known of them. There are five Natura2000-areas, 10 nature trails and 13 urban gardening areas. Parks and green areas amount to 2,400 ha, approximately 100 m^2 per inhabitant. The city also has four allotment areas. The Hatanpää allotment, established in 1916, was among the first in Finland (Municipality of Tampere, 2014).

4.1.2 Eindhoven

Geographic/demographic context

Eindhoven is the fifth-largest city of the Netherlands, with a population of 229,126 in 2018. It is the largest city in the province of North Brabant. The greater region of Eindhoven has a population of about 750.000. The Eindhoven landscape is characterized by higher sand ridges and lower valleys of streams like Dommel, Tongelreep and Gender. The area has shown different forms of landscape throughout the centuries, caused by the interaction between the subsoil and the use by humans, plants and animals. This is where the city grew with buildings and infrastructure. Along with the development of the city, a green city landscape and outer area formed. These elements together form the basis for the green structure and the built structure of the current Eindhoven. Only halfway through the 19th century, with the arrival of canal, rail and industrialization, the face of Eindhoven gradually changed. This continued

steadily after the Philips brothers founded their factory (1891). Eindhoven annexed the surrounding municipalities in 1920. Eindhoven kept growing, with a break during the Second World War, when bombing destroyed parts of the city. From the end of the 1950s the large-scale expansion of the city with new residential areas got off to a good start. After that the city grew further, to the scale of today.

Eindhoven is a green city, especially because of the green wedges that reach all the way to the center. The choice for a garden city model at the beginning of the twentieth century is still visible and offers a solid concept for development. In the 1990's the city was shocked by the departure of Philips from the city center. In the end, this had very positive consequences, for example, the development of the HighTechCampus and Strijp S. This was achieved by working in the 'quadruple helix' of government, education, business and residents. Named the 'Brainport', the Eindhoven region received recognition as a leading knowledge and innovation region. An attractive living and working environment is a basic need for maintaining the economic top position at European level. Eindhoven has the best of both worlds: an economically strong position in an international network and a pleasant living, working and living environment for residents, employees and visitors (Municipality of Eindhoven, 2017).

Climatic context

Eindhoven has an oceanic climate with slightly warmer summers and colder winters than the coastal parts of the Netherlands. Its all-time record is 36.7°C set on 26 July 2018 and −21.7°C set on 13 January 1968, while winter lows have dipped below −15°C during extreme cold snaps. Although frosts are frequent in winter, there is no lasting snow cover in a normal winter due to the mild daytime temperatures (Wikipedia, n.d.).

Table 3: Climate data for Eindhoven. Source: KNMI/Wikipedia

Climate data for Eindhoven, Netherlands for 1981–

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	16.3 (61.3)	18.9 (66)	24.6 (76.3)	29.1 (84.4)	33.4 (92.1)	35.0 (95)	36.7 (98.1)	36.6 (97.9)	33.1 (91.6)	27.0 (80.6)	20.6 (69.1)	16.4 (61.5)	36.7 (98.1)
Average high °C (°F)	5.7 (42.3)	6.6 (43.9)	10.5 (50.9)	14.5 (58.1)	18.6 (65.5)	21.1 (70)	23.4 (74.1)	23.1 (73.6)	19.5 (67.1)	14.9 (58.8)	9.6 (49.3)	6.1 (43)	14.5 (58.1)
Daily mean °C (°F)	3.0 (37.4)	3.3 (37.9)	6.3 (43.3)	9.5 (49.1)	13.5 (56.3)	16.0 (60.8)	18.2 (64.8)	17.7 (63.9)	14.6 (58.3)	10.8 (51.4)	6.6 (43.9)	3.6 (38.5)	10.3 (50.5)
Average low °C (°F)	0.0 (32)	−0.1 (31.8)	2.2 (36)	4.1 (39.4)	7.8 (46)	10.5 (50.9)	12.8 (55)	12.2 (54)	9.8 (49.6)	6.7 (44.1)	3.3 (37.9)	0.8 (33.4)	5.8 (42.4)
Record low °C (°F)	−21.7 (−7.1)	−21.6 (−6.9)	−14.7 (5.5)	−5.9 (21.4)	−2.6 (27.3)	0.3 (32.5)	2.9 (37.2)	3.6 (38.5)	−0.4 (31.3)	−6.4 (20.5)	−9.6 (14.7)	−17.4 (0.7)	−21.7 (−7.1)
Average precip. mm (inches)	63.6 (2.504)	56.9 (2.24)	58.2 (2.291)	44.5 (1.752)	54.6 (2.15)	62.5 (2.461)	77.2 (3.039)	71.2 (2.803)	62.6 (2.465)	62.6 (2.465)	78.8 (3.102)	70.4 (2.772)	750.0 (29.528)
Average precip. days (≥ 0.1 mm)	16	14	16	13	13	14	14	13	14	15	17	17	176

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Average snowy days (≥ 0.1 cm)	6	6	4	1	0	–	–	–	–	0	2	5	24
Average relative humidity (%)	87	84	80	74	73	75	75	77	83	85	89	90	81
Mean monthly sunshine hours	61.5	84.0	120.8	170.2	202.5	191.5	204.8	188.8	141.7	115.9	65.1	48.1	1,603.6

Environmental context: water and soil

Eindhoven is situated in the basin of the river Dommel at the junction of the Dommel and the Tongelreep. The Dommel and the Tongelreep are small rivers with an average discharge of a few cubic meters per second. Rainwater in Eindhoven is collected in a storm water or combined sewage system and/or in ditches and streams and transported towards the Dommel.

The larger part of Eindhoven has a combined sewage system although a separate system is slowly introduced in the city infrastructure. This change will take decades.

The soil consists of fine loamy sand with scattered layers of loam and clay. The permeability of the top layer is low (1 to 5 m/day). At a depth of approximately 25 m below surface level, the soil consists of coarse sand with a permeability of 20 to 50 m/day (www.dinoloket.nl).

4.1.3 Genova

Geographic/demographic context

Genova is the capital of the Italian region of Liguria and the sixth largest city in Italy. In 2017, 580,097 people lived within the city's administrative limits. As of the 2011 Italian census, the province of Genova, which in 2015 became the Metropolitan City of Genova, counted 855,834 residents.

Located on the Gulf of Genova in the Ligurian sea, Genova has historically been one of the most important ports on the Mediterranean sea: it is currently the busiest in Italy and in the Mediterranean Sea and twelfth-busiest in the European Union. Genova has been nicknamed la Superba ("the proud one") due to its glorious past and impressive landmarks. Part of the old town of Genoa was inscribed on the World Heritage List (UNESCO) in 2006 as Genova: Le Strade Nuove and the system of the Palazzi dei Rolli. The city's rich cultural history in art, music and cuisine allowed it to become the 2004 European Capital of Culture. It is the birthplace of Christopher Columbus, Andrea Doria, Niccolo Paganini, Guiseppe Mazzini, Renzo Piano, among others.

Genova, which forms the southern corner of the Milan-Turin-Genoa industrial triangle of Northwest Italy, is one of the country's major economic centers. The city has hosted massive shipyards and steelworks since the 19th century, and its solid financial sector dates back to the Middle Ages. The Bank of Saint George, founded in 1407, is among the oldest in the world and has played an important role in the city's prosperity since the middle of the 15th century. Today a number of leading Italian companies are based in the city, in particular companies linked to the high-tech sector. In recent years the city has become a touristic destination.

Climatic conditions

Genova has a borderline subtropical (Cfa) and Mediterranean climate (Csa) in the Köppen climate classification, since only one summer month has less than 40 mm of rainfall, preventing it from being classified as solely oceanic or Mediterranean; with a special note for the Genova low.

The average yearly temperature is around 19°C during the day and 13°C at night. In the coldest months: December, January and February, the average temperature is 12°C during the day and 6°C at night. In the warmest months – July and August – the average temperature is 27.5°C during the day and 21°C at night. The daily temperature range is limited, with an average range of about 6°C between high and low temperatures. Genoa also sees significant moderation from the sea, in stark contrast to areas behind the Ligurian mountains, such as Parma, where summers are hotter and winters are quite cold.

Annually, the average 2.9 of nights recorded temperatures of ≤0°C (mainly in January). The coldest temperature ever recorded was −8°C at night in February 2012; the highest temperature ever recorded during the day is 38.5°C in August 2015. The average annual number of days with temperatures of ≥30°C is about 8, average four days in July and August. Average annual temperature of the sea is 17.5°C, from 13°C in the period January–March to 25°C in August. In the period from June to October, the average sea temperature exceeds 19°C.

Genoa is also a windy city, especially during winter when northern winds often bring cool air from the Po Valley (usually accompanied by lower temperatures, high pressure and clear skies). Another typical wind blows from southeast, mostly as a consequence of Atlantic disturbances and storms, bringing humid and warmer air from the sea. Snowfall is sporadic, but does occur almost every year, albeit big amounts in the city centre are rare.

Annual average relative humidity is 68%, ranging from 63% in February to 73% in May.

Sunshine hours total above 2,200 per year, from an average 4 h of sunshine duration per day in winter to average 9 h in summer. This value is an average between the northern half of Europe and North Africa.

Table 4: Climate data for Genova. Source: ServizioMeteorologico/Wikipedia

Climate data for Genoa (1971–2000 normals)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	11.5 (52.7)	12.2 (54)	14.6 (58.3)	16.8 (62.2)	20.5 (68.9)	23.9 (75)	27.3 (81.1)	27.7 (81.9)	24.4 (75.9)	20.0 (68)	15.1 (59.2)	12.5 (54.5)	18.9 (66)
Daily mean °C (°F)	8.5 (47.3)	9.1 (48.4)	11.4 (52.5)	13.7 (56.7)	17.4 (63.3)	20.8 (69.4)	24.1 (75.4)	24.4 (75.9)	21.1 (70)	16.9 (62.4)	12.2 (54)	9.5 (49.1)	15.7 (60.3)
Average low °C (°F)	5.5 (41.9)	6.0 (42.8)	8.2 (46.8)	10.5 (50.9)	14.2 (57.6)	17.6 (63.7)	20.9 (69.6)	21.0 (69.8)	17.9 (64.2)	13.8 (56.8)	9.2 (48.6)	6.5 (43.7)	12.6 (54.7)
Average rainfall mm (inches)	101.8 (4.008)	74.0 (2.913)	81.7 (3.217)	88.0 (3.465)	72.4 (2.85)	58.2 (2.291)	24.2 (0.953)	69.3 (2.728)	136.4 (5.37)	171.3 (6.744)	108.8 (4.283)	93.1 (3.665)	1,079.2 (42.488)
Average rainy days (≥ 1.0 mm)	7.7	5.6	6.9	8.1	7.0	5.0	2.8	5.0	6.0	8.0	7.1	6.5	75.7
Average snowy days	0.9	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.3

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Mean monthly sunshine hours	117.8	130.5	158.1	192.0	220.1	246.0	294.5	266.6	201.0	173.6	111.0	111.6	2,222.8

Source #1: ServizioMeteorologico, data of sunshine hours

Source #2: RivistaLigure "La neve sullecoste del Maditerraneo"

Environmental characteristics

The hydrographic basin of the Lagaccio district is characterised by narrow, steep valleys converging towards the sea, a common situation in Liguria and across Italy that causes waterways to be flood-prone. The Cinque Santi and Granarolo rivers both flow into the Lagaccio River, all of which are mostly underground, covered by extensive urban infrastructure.

This has led to the critical situation the disctrict experiences today, with the rivers frequently overflowing and causing floods. In the middle of the valley there is a former military compound, the Gavoglio Barracks, built over the Lagaccio River and subject of a substantial planned redevelopment project.

Regarding the soil characteristics, the district of Lagaccio is characterized by calcareo-marly turbidities, sometimes siltose, calcarenites, marl and calcareous marl, alternating with pelagic shales, belonging to the formation of limestones of mount Antola. The valley floor of the Lagaccio river and the ancient basin of the homonymous artificial lake are today filled with artificial carry-overs of various eras that have leveled the original river course.

From a geomorphological point of view, the area is characterized by the widespread presence of outcropping rocks in good conservation conditions and with favorable disposition of its structures in relation to the slope.

The whole area of the Lagaccio has large areas of rocky clusters characterized by low permeability, in large part the surface is sealed as a result of construction activities.

Further analyses (currently underway), required by land characterization plan, are intended to determine the possible presence of contaminants resulting from past industrial activities. Only after these analyses will it be possible to define the actions needed to reclaim the land in order to accommodate the new functions of the urban park (Climate-data.org, 2019).

4.2 City: NBS to be implemented in UNaLab context

4.2.1 Tampere

The main NBS demonstration site in Tampere is located in Vuores, a green district under construction located in the centre of a green area and natural waterbodies. The smart district, to be completed by 2030, offers innovative construction and hosting solutions and uses cutting-edge technologies and innovative co-created NBS systems that will be scaled up and developed in Hiedanranta. The NBS installed will be complementary to the existing ones.

In addition to the demonstration site located in Vuores, there is a second site in Tampere located in Hiedanranta, a former industrial area slated into a housing district. The planning of Hiedanranta is currently in the initial stages with a great deal of flexibility.

Table 5 shows which NBS the city of Tampere is going to implement in the context of UNaLab.

Table 5: TAMPERE Nature Based Solutions

TAMPERE Nature Based Solutions			
#	NBS	General description	Scope/impact
1	Retention basins and alluvial meadows	Vuores: co-created retention/infiltration basin with alluvial meadows for urban runoff in Tervaslammen Park (area of retention basin and alluvial meadows ca. 700 m2)	Storm water management Increase recreation areas Increase biodiversity
2	Green roof	Implementation of ca. 800 m2 green roof in Hiedanranta to manage water flows (storage) and quality, with particular focus on their performance during cold seasons, suitable growth media, plants (biodiversity) and maintenance needs. Aim is to develop replicable solutions for construction companies and bring added value to local residents/dwellers of the city.	Storm water management Social connectivity enhancement Increase biodiversity Management of rapid growth/densification
3	Biofilters to manage waters from residential area and dog park	Vuores: Virolaisten Park co-created biofilter (area of biofilter ca. 650 m2).	Water flows management (quality)
4	Urban gardens with small-scale NBS	Innovation vouchers to enable existing housing companies and other communities (ca. 3 sites) in Vuores to co-design and co-implement small-scale NBS and complementary infrastructure (e.g. green roofs or walls, rain gardens, rainwater collection systems for non-potable irrigation, etc.) and/or urban garden areas.	Social connectivity enhancement Management of rapid growth/densification Storm water management Increase biodiversity
5	Biofilter to manage storm waters from contaminated site Hiedanranta	Co-created biofilter for seepage water from old industrial (pulp mill) landfill (area of biofilter 100 m2) in Hiedanranta. Biochar and Leca® gravel will be tested as a part of filtration structures.	Water flows management (quality)
6	Microalgae-based system	Pilot-scale microalgae-based system in Hiedanranta for integrated urban water management, urine treatment and nutrient recovery. Micro-algae is grown using source separated urine as a nutrient source.	Water flows management (quality)
7	NBS education	Awareness raising and education about NBS, water quality and biodiversity. Information signs. Educating schoolchildren to monitor water quality and water insects.	Education
8	NBS accessibility	Improvement of accessibility: Duckboards to improve citizens accessibility to conservation area in Vuores.	Improvement of accessibility

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4.2.2 Eindhoven

The city of Eindhoven has selected several locations within its city centre, with different urban characteristics, in which various NBS will be implemented. The focus of the NBS demonstration in Eindhoven will be the integration of blue (water), green (flora) and grey (built environment) areas, to provide a safe and pleasant living environment for the citizens.

The city of Eindhoven is going to implement the following NBS in the context of UNaLab (Table 6):

Table 6: EINDHOVEN Nature Based Solutions

EINDHOVEN Natural Based Solutions			
#	NBS	General description	Scope/impact
1	Green areas	Impermeable pavements are replaced with green spaces or pavements with more permeable materials.	Water flows management
			Increase biodiversity
			Heat stress reduction
			Improve air quality
2	Re-establishment of watercourses (daylighting)	Section of covered watercourses are uncovered and the courses re-established	Water flows management
3	Linking of blue-green urban areas	Connecting existing blue-green areas to improve the robustness of the water system as well as the ecological structure	Water flows management
			Increase biodiversity
4	Preparation of water storage areas	Part of the daylighting of the river Gender will be in the Victoria park. Retention will be facilitated in the park as part of Gender profile	Water flows management (storage)
5	Implementation of green roofs / green building façades	Implementation of green surfaces (roofs and façades) in existing buildings	Water flows management
			Increase biodiversity
			Heat stress reduction

4.2.3 Genova

The city of Genova has recently approved a Requalification Plan for Gavoglio Barracks located in the centre of Lagaccio district. The city is going to test a number of NBS by deploying urban water drainage systems and increasing green spaces, aimed at improving water management and the resilience of the whole area to possible flooding.

The city of Genoa is going to implement the following NBS in the context of UNaLab (Table 7) :

Table 7: GENOVA Nature Based Solutions

GENOVA Natural Based Solutions			
#	NBS	General description	Scope/impact
1	Draining flooring	Carriageable surfaces covered in resin gravel or draining concrete and pedestrian surfaces with eco-compatible binder	Water flows management
2	Draining game areas	Natural recreational areas with sand, draining surfaces and games connected to natural elements (slides on slopes, on gabions, wooden games, etc.)	Water flows management
			Social connectivity enhancement
3	Retention systems	Underground systems composed by modular elements to retain meteoric waters for irrigation	Water flows management (storage)
4	Infiltration basins	Depressions vegetated soil for the temporary retention of surface meteoric waters, with filter bottom and herbaceous vegetation	Water flows management
			Increase biodiversity
5	Gabions stone	Box filled with rocks, concrete or sometimes sand and soil, for erosion control and land reshaping	Water flows management
6	Vegetated gabions stone	Terraced system of gabions in wire mesh filled with shattered debris from demolitions and shrubs planted in the interstitial space at various levels	Water flows management
7	*Xerophilous* flowered meadows	Lawns with perennial *xerophilous* grasses characterized by high tolerance to drought periods	Water flows management
			Water saving
8	Groups of trees	Groups of trees planted into the new green areas in order to increase of biodiversity and urban quality.	Water flows management
			Increase biodiversity
			Heat stress reduction
			Improve air quality

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4.3 City: Familiarity with NBS and co-creation

This section contains a description, for each city, on how familiar the people, working for the city and the participants of the workshops, are with the concept of Nature Based Solutions and the concept of co-creation.

4.3.1 Tampere

People working in the city of Tampere are fairly familiar with NBS. The UNaLab-project and other EU-funded projects have organized NBS-related seminars and excursions so the people working at the municipality are quite familiar with NBS.

The city is also quite familiar with concept of co-creation. In many planning processes they already have participation processes required by law. In the city's strategy department, there are colleagues who are familiar with co-creation and they have had some co-creation related processes, but their knowledge has not yet spread to other city departments. In this case, co-creation in the context of NBS requires clarification.

Apart from the experts that were present, the participants of the workshops were mostly not familiar with NBS. For Tampere, in the UNaLab project their goal is to raise awareness regarding NBS with, e.g., information signs, educating school and kindergarten children and participating in local events. On the other hand, people in Finland and Tampere live near forests and lakes, and have close connection to natural environment. It is more novel urban NBS that people are not so familiar with.

The participants were somewhat familiar with co-creation. They are familiar with participation processes that are related to land use planning. This means residents have a possibility to comment on plans that the municipality has for their community. Co-creation is a new way of organizing participation and people are not really familiar with it. In Finland the public sector is strong, and people expect the municipality to take responsibility of planning, building and maintenance of NBS.

4.3.2 Eindhoven

In the municipality of Eindhoven, employees are fairly familiar with NBS. The people working on the implementation of NBS try to inform their colleagues but also the politicians about the possibilities and the urgency to act.

The inhabitants of the city are familiar with the concept of co-creation. For many years, the municipality has actively involved citizens in policy and development processes. Not only because it is required by the Dutch law, but also because it fits the local mind-set and the principle of working in the so-called Quadruple Helix of government, business, education and citizens/inhabitants. Citizens are involved in processes as early as possible. The most important thing is that people not only have a voice when things are already decided, but that they have a voice in the process of building ideas and designing solutions.

Most of participants of the workshops were familiar with NBS. The goals in the Eindhoven workshops was to get NBS implemented, not so much to explain what the meaning is of NBS. Of course, the workshops started with finding out together what NBS are about, to have a common baseline of understanding about the subject.

All participants were familiar with co-creation. They were experts in various fields connecting to NBS and from different parts of the development process. Most of them were familiar with both being invited to co-creation meetings and organising them.

4.3.3 Genova

In the city of Genova, NBS are not well known amongst the staff. The reason is that it concerns relatively recent techniques while most of the staff of the municipality of Genoa is composed of people accustomed to using traditional engineering techniques. The result is a lack of knowledge of the alternatives provided by NBS. There is even a certain degree of distrust towards solutions that are considered not entirely reliable, compared to those of a traditional type. An important theme for Genova is how to overcome this distrust and encourage colleagues to use NBS as well as traditional solutions.

Considering co-creation in Genova, the city is not really familiar with it. There are national laws that provide for some forms of participation in the training process and urban planning instruments, but co-creation specifically is a relatively new technique that is entering into the operations of administrations, especially in large cities. Genoa has already experimented with various forms of participatory processes, and co-creation is a further step forward compared to the past activities.

The participants have varying levels of familiarity with NBS. They were of different types of participants at the session, ranging from experts but also citizens who were not familiar with the topic, so the knowledge of the NBS differed. This made it necessary to make a preliminary work of information and illustration of the NBS to enable everyone to participate actively in the process.

Co-creation is not yet a widespread procedure, but in the city and in the case of the former Gavoglio barracks in particular, there have been some participatory experiences that have brought many citizens closer to the discussion on the design of urban spaces.

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4.4 Comparing the cities

The following figure shows the relative scores on how familiar the people working for the city are with the concept of Nature Based Solutions and the concept of co-creation, and how familiar the participants of the workshops are with these concepts.

In both Tampere and Eindhoven, co-creation has been a familiar concept for quite some time. On the subject of NBS, the knowledge is there, but the workshops were certainly helpful to align definitions and collect potential solutions with several stakeholders. In Genova on the other hand, the city and participants were not very familiar with NBS and co-creation at the start of the project. In the workshops they gained experience with and knowledge about both, applying NBS on the site design in a joined effort of stakeholders.

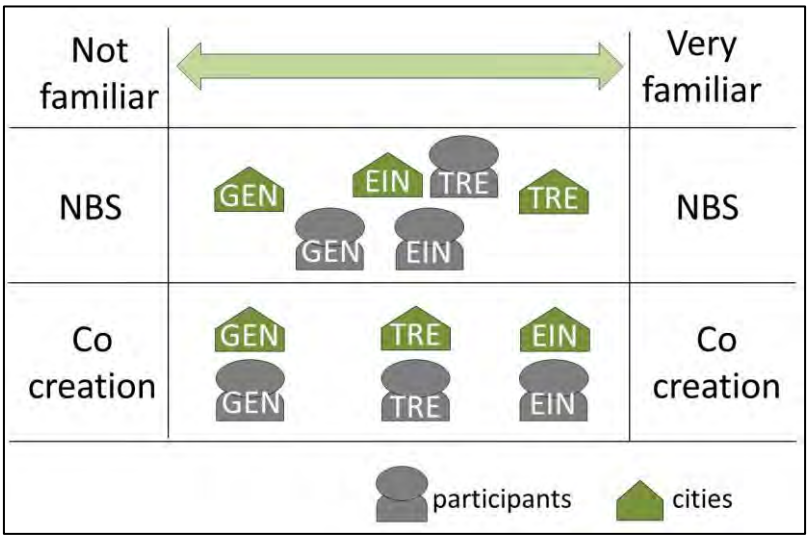

Figure 4. Familiarity with NBS and co-creation in the cities.

5. SETTING OF WORKSHOPS

This chapter contains an explanation of the setup, goal and objective of the series of workshops in general. It also provides information on how stakeholders were selected, about the stage of the process in which the workshops are set, and which stakeholders were present. The chapter finishes with information about the logistics, such as rooms and other means to stage the workshop. This benchmark makes it possible for the reader to browse between different possibilities and find similarities with their own set-up.

5.1 Tampere - General

5.1.1 General setup

Tampere organised workshops in two locations. Workshops were held in and about Vuores, the green district under construction located in the centre of a green area and natural waterbodies; and in Hiedanranta, the former industrial area that will be transformed into a housing district.

The main goal of the co-creation process had two sides. On the one hand the goal was to increase awareness of NBS, and how they can solve problems, and on the other hand to hear the views of the citizens on how their neighbourhood and city should be developed from viewpoint of NBS.

The city used a mix of techniques that fit the different stakeholders that participated in their meetings. They had a series of Design Thinking workshops in both case areas: Visioning – Ideating – Testing. All together there were six workshops and 258 participants. Techniques used in Vuores: Participatory design game for mainly residents, LEGO® workshop for school and kindergarten children and nature trail for residents. Techniques used in Hiedanranta: open idea co-creation workshop for various groups of stakeholders (residents, NGOs, city personnel), idea developing seminar and workshop for experts, guided walking tour for residents and NGOs.

5.1.2 Selection of stakeholders/participants

In Tampere, there is no standard approach for the selection of stakeholders to participate in co-creation processes. Lists of relevant stakeholder groups were collected in TRE UNaLab team meetings and beyond. For example, the organisers received a list of water engineers in Tampere from the city's construction supervision department. Additionally, they used a list of Vuores' housing and maintenance companies from Vuores' service company.

Stakeholders were approached through the existing communication channels of Hiedanranta, Vuores and the City of Tampere, which includes website invitations and Facebook events, by mail, Tamperelainen magazine, stand activities, through acquaintances and word of mouth, and with a map-based pre-questionnaire of the Vuores NBS that received more than 40 answers and included an invitation to a workshop.

Depending on the workshop, participants were residents, school children, day care and teachers, NGOs and students, private professionals and researchers, and public and city professionals. Private professionals included architects, landscape architects, urban planners, various technical consultants, building companies, applied researchers and manufacturers of NBS related products. Public professionals included university staff, and city professionals included green areas and stormwater planners, Hiedanranta project managers, a constructor of public areas, a green field maintenance foreman and gardeners.

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The Tampere workshops had slightly more female participants (60/40). The subject of the workshops should attract male and female participants equally, and no difference was made in the selection, invitation or involvement of either. In the end, there was a good variety of participants. Most of the citizens were either living or working in the nearby areas. Some had been interested in the development of the area already for years and some did not have that much pre-existing information.

5.2 Tampere - Vuores

5.2.1 Goal and objective separate workshops

Workshop 1: The goal of the first workshop was to create a shared vision of the Vuores NBS living lab: needs and ideas, best practices and to learn from the current NBS. The main objective was to combine the NBS related experiences from the residents, other users of the area and experts / city and learn how to develop the solutions further in Vuores as well as in Hiedanranta and follower cities. Other objectives were to share the knowledge of the solutions to the residents and inspire them to participate in the UNaLab-process.

Workshop 2: This workshop was aimed at educating the pupils in Vuores' elementary school about the NBS in the region and to raise awareness of NBS. In the workshop the city wanted to collect ideas to develop NBS further as well as to give the pupils tools to monitor water quality and biodiversity. An additional objective was to collect views and experiences of NBS as well as to innovate new ways of utilizing these solutions for recreation, play and enhancement of biodiversity.

Besides that, the occasion was also utilized to get experience on organizing a workshop with children because the workshop was replicated next day for children of Takahuhti elementary school and kindergarten as a part of Tanhuanpuisto park development.

Workshop 3: In the final workshop, the objective was to develop NBS in Vuores and collect good practices that could possibly be transferred to Hiedanranta area development. The real needs of the different stakeholders involved were identified, emphasising especially the point of view of citizens. The objective was to test the solutions various stakeholders have suggested in the first and second workshop as well as to innovate new ways of utilising these solutions for recreation, play and enhancement of biodiversity.

5.2.2 Stage in process

Using the steps in design thinking: exploration, vision creation, idea creation, prototyping and testing.

Workshop 1: Vision creation combined to testing, since some of the NBS discussed in the workshop are already in use and some could be executed later.

Workshop 2: Vision creation and testing. On one hand we challenge the pupils to create ideas around existing NBS in Vuores while also allowing them to come up with new ideas which could be installed in the future. The pupils will also be given tool to monitor biodiversity and they are expected to conduct monitoring between the second and the third workshop.

Workshop 3: Prototyping and testing. The pupils got tools to monitor biodiversity and the quality of the water after the second workshop, and now they presented the results of the monitoring they did together with the teachers.

5.2.3 Stakeholder groups

Workshop 1: Residents, users (recreational use); housing company; representatives of the city
Workshop 2: Children between ages 5 and 12; teachers; representatives of city
Workshop 3: Families with children; retired people; representatives from city.

5.2.4 Logistics

Duration: 1-3 hours

Facilities:

Workshop 1:

- Seminar / meeting room in Vuores
- Tables, chairs, a projector plus laptop, white board
- Working stations
- Materials (A0 maps and game cards) for the 4 working stations

Workshop 2:

- Seminar room in Vuores school (Figure 5)
- Tables, chairs, a projector plus laptop
- Class rooms in Vuores school
- DIY/craft materials for children
- Many facilitators (1+ teacher per class)
- Water monitoring kits

Figure 5: second workshop in Vuores (TRE)

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Workshop 3:

- App: 'Action Track'
- UNaLab information stand at the school yard (tent, roll-up, tables, experts, small aquarium for water insects, microscope)
- Guided nature trail (professional guide)
- Unoccupied check points around Vuores, equipped with information and voting boards.

5.3 Tampere - Heidanranta

5.3.1 Goal and objective separate workshops

Workshop 1: The goal of the workshop was to co-create ideas and vision(s) for NBS in Hiedanranta. The city chose three themes to focus on: (storm)water solutions, biodiversity, and recreation. In reality the themes are of course intertwined. The main objective was to hear participants' hopes and dreams of NBS in future Hiedanranta, and form visions based on them. These visions will be presented to the building experts in the next workshop of this series.

Workshop 2: The ideas from the first workshop were brought to a more concrete level, hoping to spark some new and concrete ideas for NBS in future Hiedanranta. The visions created in the first workshop are the background for this workshop. Now the city looked for input from city planning and building professionals, to hear what they think is important to take into account in the next phase of the planning and implementation. The workshop was part of a full day seminar organized by UNaLab Tampere and CircHubs projects.

Workshop 3: This workshop was aimed at developing the ideas from the earlier workshops further, hearing citizens' opinions of them. The city was especially curious about opinions about NBS for contaminated waters and also already existing NBS on the area; to find possible spots for demonstrating some of the co-created ideas in the near future. The workshop was combined with a walking tour that bound the ideas concretely on the site they are being planned for.

5.3.2 Stage in process

Using the steps in design thinking: exploration, vision creation, idea creation, prototyping and testing.

Workshop 1: Vision creation, since the planning of the new use of this old industrial area (Hiedanranta) has just begun. There have also been only few smaller NBS related experiments and projects in the area and the organisers didn't expect to get participants who could share their experiences about them.

Workshop 2: In the development process of Hiedanranta, Tampere is still at the vision creation level, since the planning of the new use of this old industrial area (Hiedanranta) has just begun. However, we are now at a more concrete level than in the first workshop, so this time the workshop focuses on idea generation.

Workshop 3: Vision creation, but strongly leaning towards experimentation.

5.3.3 Stakeholder groups

Workshop 1: Members of local NGOs or other people who have been using the space in Hiedanranta temporarily; some experts from the City of Tampere.

Workshop 2: Professionals / experts in city planning, architecture, building, maintenance etc. Some from the public sector (e.g., City of Tampere), some from the private (architect or maintenance firms, etc.), some from the universities.

Workshop 3: Experts; elderly people, some young and middle-aged people; mostly working or living in nearby areas.

5.3.4 Logistics

Duration: 1-3 hours

Facilities:

Workshop 1:

- Seminar / meeting room in in Hiedanranta
- tables, chairs, a projector plus laptop, white board
- working stations
- materials for the 3 working stations

Workshop 2:

- seminar room in city center
- tables, chairs and a projector plus laptop
- working stations
- materials for the 8 working stations

Workshop 3:

- Start in seminar / meeting room in in Hiedanranta
- After that, a walking tour (Figure 6) containing several spots where group stopped and listened to the experts and / or discussed about the NBS.

Figure 6: Walking tour in Hiedanranta (TRE)

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5.4 Eindhoven

5.4.1 General setup

The city of Eindhoven organised three workshops in a co-creation process with professionals, to explore NBS in Eindhoven and to find ways to improve the process of implementation. The objective of the series of workshops was to create a community of practice for the application of NBS and to find out how NBS can become more often the 'standard' for projects in public space. In three workshops the challenge was reframed several times and the group worked towards concrete solutions and plans for a Community of Practice - in co-creation with stakeholders. In between the sessions, additional activities were done to involve more stakeholders and build upon existing initiatives and solutions. Together, the sessions formed the first iteration of a Design project.

All UNaLab-projects in Eindhoven follow their own 'standard' process for stakeholder/citizen involvement and co-creation. This means that stakeholders are involved early in the process, using techniques and methodologies that fit the project. Citizens and other stakeholders are involved in the implementation of NBS through these processes.

5.4.2 Goal and objective

Workshop 1: The participants looked at the definition of the challenge of implementing NBS.The objective of the workshop was to explore the meaning of NBS in Eindhoven and the way they are/can be implemented.

Workshop 2: The second workshop was focused on discovering and understanding the challenge of implementing NBS further. In the workshop participants defined ideas to tackle the challenge and started inventing solutions together.

Workshop 3: In the final workshop, ideas to tackle the challenge were defined tested. The goal was to create awareness for the possibilities of a community of practice supported by ideas how to actually get started as a community. The objective of this workshop is to make 'prototypes' of ideas, explain and test concepts.

5.4.3 Stage in process

Using the steps in design thinking: exploration, vision creation, idea creation, prototyping and testing.

Workshop 1: Definition of the challenge; Exploration and vision creation.

Workshop 2: Idea creation. This workshop is aimed at defining ideas to tackle the challenge.

Workshop 3: Prototyping and testing; Benchmark: learning from other disciplines and domains. This workshop is aimed at defining ideas to implement NBS.

5.4.4 Stakeholder groups

All three workshops: professionals - representatives of local government, provincial government, NGOs, professional organisations, and an energy company.

5.4.5 Selection of participants

The workshops in Eindhoven followed the Design Thinking process that is customary for the city. The participants were one focused group of professional experts in related fields. The group consisted of people from the municipality (communication, area coordination, project leader, water policy, green policy, maintenance); people from health board, water board,

province; energy company, professional association of gardeners, and an association of environmental and green organisations (NGOs). The list of participants was compiled by first identifying the main stakeholders in general terms, and after that names were added using formal and informal city networks.

The city has a standard method for the identification of stakeholders, which is part of the co-creation methodology, and can be supported by colleagues from the communication department. The gender of the participants was balanced, close to 50/50. The subject of the workshops should attract male and female participants equally, and no difference was made in the selection, invitation or involvement of either.

5.4.6 Logistics

Duration: 4 hours, with short breaks when needed.

Facilities:

- One big room
- Room to walk and stand around
- Empty walls or rolling boards to pin posters on (Figure 7)

Figure 7: workshop room in Eindhoven (EIN)

Posters were prepared for each workshop, and put on the walls, some of them containing input form the earlier workshops, some for the participants to fill in during the workshop. Nothing was presented using beamers or screens.

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5.5 Genova

5.5.1 General setup

In Genova, the workshops were dedicated to the re-development of the Plan for Gavoglio Barracks located in the centre of Lagaccio district. In the workshops, NBS as a concept was explained and after that NBS were applied to the re-design of the area by the participants.

The goal was to present the analyses carried out on the ground, the available data, acknowledge the observations and problems of the citizens, their expectations and their needs, then illustrate the possible project scenarios.

5.5.2 Goal and objective

Workshop 1: The goal was to obtain a common vision on the possible park development project to the light of the site features and environmental restrictions using NBS. This way, the city wanted to spread and share the project, connect the different stakeholder and their knowledge on the urban space in question. Finally, the objective was to promote the knowledge of NBS and share possible scenarios and visions.

Workshop 2: In the second workshop the city aimed to elaborate project ideas and NBS for the urban park, on the basis of the common vision generated in the prior workshop. The topics were: Water – Green – City/Park nexus. The objective was to draw a list of ideas and shared solutions to apply to the park design.

Workshop 3: In the final workshop, participants worked on the park layout inserting the different functional elements with pre-prepared cards and building a shared layout. The objective was to co-create an urban park, to connect different stakeholders and their knowledge of the urban space in play, and share the planning choices.

5.5.3 Stage in process

Using the steps in design thinking: exploration, vision creation, idea creation, prototyping and testing.

Workshop 1: Elaboration of a common vision and subsequent application to reality.

Workshop 2: Ideas generation: from a common and shared vision on how we imagine the park to practical proposal on how to realise it.

Workshop 3: To identify the functions and the planning elements to insert in the final project (prototype).

5.5.4 Stakeholder groups

Workshop 1: Citizens, neighbourhood groups and schools' representatives.

Workshop 2: The table was made up of citizens and technicians (from the region, from the municipality's companies, and independent professionals).

Workshop3: Citizens, neighbourhood groups, public administration technicians, professionals, companies, academy.

5.5.5 Selection of participants

The choice of participants was made by the organisers together with the city participation office, according to the territorial knowledge gained during the project. In general, the standard approach to choose stakeholders is based on the project. The city uses databases that are adapted according to the type of project. Sometimes, a more random selection is used like distributing flyers or participating at local events.

The workshops in Genova attracted more male participants than female (70/30). The subject of the workshops should attract male and female participants equally, and no difference was made in the selection, invitation or involvement of either.

5.5.6 Logistics

Duration: 3-4 hours, no breaks intended

Meeting venue: in a city centre hotel, not far from the demo-site (Figure 8)

Materials: tables, chairs, stationery, computer and projector, information material

Figure 8: Workshop room in Genova (GEN)

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5.6 Comparing the cities

5.6.1 General setup, stakeholders, logistics

While having similar goals, and of course all having the general goal of exploring the possibilities of NBS, the chosen general setup of the workshops was quite different.

In *Tampere*, various types of participants were involved, and the workshops were set up according to the needs and possibilities of the participants.

In *Eindhoven*, only professionals were involved, in an ordinary meeting room.

In *Genova*, people from the area and people involved in designing and developing the park were brought together in the workshops to co-create the actual design. A venue was used that was conveniently close to the development area.

5.6.2 Goal and objective

The following table shows the goals and objectives of the separate workshops, in generalised terms. All cities used series of three workshops, marked in the table as 1, 2, 3. In general, the first workshop was aimed at familiarizing participants with the subject and sharing views. In the second step, the participants worked mostly on creating solutions that were tested in the third and final workshop.

Tampere had two sets of three workshops, to explore the subject and test ideas. For Genova, exploring the subject and creating awareness was a theme for all three workshops. In Eindhoven, the workshops were focused on creating a strong network to help implementation of NBS in general.

Table 8: Goals and objectives of workshops.

GOAL & objective	Tampere		Eindhoven	Genova
(workshop 1, 2, 3)	**Vuores**	**Hiedanranta**		
define challenge			1	
createvision	1	1		1
share vision	1			1 2
create content / make design / collect ideas	2 3	1 2	2 3	2 3
explore, familiarize with subject	1 2 3	1 2 3	1 2	1 2 3
familiarize with audience	2			
create awareness	2		3	1 2 3
collect needs	3			
collect feedback		3	3	2 3
test ideas	3	3	3	3
share knowledge			2	
network: how to involve parties			2 3	

5.6.3 Stage in process

This table shows the stages in the process of the various workshops, following Design Thinking standards. All cities used series of three workshops, marked in the table as 1, 2, 3. All series of workshops followed the 'standard' process, with a different focus in the separate workshops.

Table 9: Stage in process (Design thinking) of workshops.

stage of process Design Thinking	Tampere		Eindhoven	Genova
	Vuores	Hiedanranta		
exploration	1	1	1	1
vision creation	12	1 2 3	1	1
idea creation	2	2	2	2
prototyping	3	3	3	3
testing	1 2 3	3	3	3

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6. WORKSHOP RESULTS

This chapter contains a description of what actually happened during the workshops in each city. It provides information about the involvement of participants, tangible and intangible outcomes, ideas collected, controversial topics, goals, expectations, commitment to follow up and the perceived impact of the workshops. The chapter ends with a comparison of the results of all the workshops.

6.1 Workshops Tampere - Vuores

6.1.1 Participants

Workshop 1: 14 external participants + 12 representatives from the city of Tampere, Ramboll, Regio Hub and VTT.

Workshop 2: 87 pupils, 6 teachers, and 8 representatives from the city of Tampere, Ramboll and VTT.

Workshop 3: The application had no limit regarding the number of participants. Participants could give feedback to project personnel at the UNaLab stand placed on the festival area. It is not possible to give an exact number of participants at the UNaLab stand. Overall Vuores Day attracted more than 2500 visitors. There were 12 participants in the nature walk. Additionally 9 representatives from the city of Tampere, Ramboll and VTT participated in the event.

6.1.2 Participant involvement

Workshop 1: Everyone was involved in the discussion.

Workshop 2: Everyone was involved in the discussion. However, some of the children were more active and braver while some of them were a little shy. The facilitators encouraged also the shy ones to participate.

Workshop 3: Pupils presented the results of the monitoring they made, the experts of the city of Tampere and Ramboll were present at the UNaLab stand to inform about the project and the activities. External experts shared their knowledge during the nature trail.

Some of the participants were more involved in the discussion than others. Those who visited the UNaLab stand usually had a question or questions. But there were also those who just observed. The same applies to the participants of the nature trail.

Lessons learned - tips to get participants involved

- A game worked well for this purpose, since the playful method lowers the threshold to participate and express your own views.
- It is crucial to educate stakeholders of different NBS in the beginning of the workshop. Most people are not familiar with them.
- Maps, pictures and plan of the area are useful as a base for discussion
- In case children are involved, the length of any activity should be carefully thought of. In this event smaller children (4-5 year-olds) were given an opportunity to start with co-creation already after 30 min of speeches. And for the older pupils the speeches lasted an hour and then it was time to co-create. This worked well.
- It was a good idea to organise the workshop alongside a popular city district event. The workshop was promoted in Vuores-portal which is well known among the residents. Additional promoting was done through the website of the city of Tampere. It was also a

good idea to organise the nature trail – it allowed people to receive information first hand from the experts.

6.1.3 Outcomes

Vuores

Workshop 1:

Intangible: Citizens' opinions about the NBS and how they see their effect on recreational and biodiversity values.

Tangible: The most popular ideas of adding recreational and biodiversity values will be regarded in the further development of the stormwater management of Vuores. Some of the results may also be utilised in the NBS planning of Hiedanranta.

Workshop 2:

Intangible: Documented evidence of how pupils of Vuores elementary schoolchildren see and understand the NBS in the region and how these solutions could add more value to both recreational use and biodiversity.

Tangible: Pupil's drawings and NBS built with LEGO® and blocks (Figure 9).

Figure 9: Children's workshop results Vuores (TRE)

Workshop 3:

Intangible: Practical knowledge from the experiences of the residents and other users (what works / does not work, wishes).

Tangible: NBS cards filled in by the participants.

6.1.4 Ideas collected

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Workshop 1: ca. 37 ideas; ca. 10 new ideas;

Best ideas:

- Children's role as "nature cops" monitoring the NBS;
- Direct the storm water to dry areas in Vuores; Involve horses from the local stables to maintaining activities;
- "Wild areas" for new forms of urban farming;
- Community maintained insect hotels;
- Natural equipment for children to play – nature based play (to prevent the play with construction materials, which children have been spreading e.g. in waterways)

Workshop 2: ca. 40 ideas, ca. 20 new ideas;

Best ideas:

- Glass walled channel in the retention pond where one can observe the underwater life
- Insect hotels for water insects too
- Multifunctional park including different activities such as water park, bonfire places, walls for climbing
- Nature trails with information about area's endangered species
- Monitoring stations for water quality
- Fountains
- Urban gardening
- Easy entering to streams and ponds so that playing with water toys is possible

Workshop 3: The aim of this final workshop was testing the ideas found in the first and second workshop but we also got some new ideas:

- A shortcut path from Vuores to Hervanta and a bridge over Lake Suolijärvi
- No more cutting down the trees
- Invasive species like lupines should be uprooted
- A dock for Lake IsoVirolainen

Summary of Vuores ULL co-creation results:

- Recreation: More accessible green areas that encourage physical activities.
- Biodiversity: More city green and also wilder parks.
- Water management: Novel NBS to protect water quality and more info regarding NBS.

6.1.5 Controversial topics

- The water condition in the nearby lakes, impacts of the construction runoff.
- If there will be enough space for flora and fauna in Vuores when the construction phase comes to an end.
- The ongoing construction as well as water quality in the lakes and smaller ponds in and around Vuores

6.1.6 Goals

Tampere organised workshops in both locations of their UNaLab projects. On the one hand the goal was to increase awareness of NBS, and how they can solve problems, and on the other hand to hear the views of the citizens to how their neighbourhood and city should be developed from viewpoint of NBS.

Workshop 1: The goal was to create a shared vision of the Vuores NBS living lab: needs and ideas, best practices and to learn from the current NBS.

Workshop 2: The second workshop was aimed at educating the pupils and teachers in Vuores elementary school of the NBS in the region and to raise awareness of NBSas well as to give the pupils tools to monitor water quality and biodiversity. Also to get experience about organizing a workshop with children.

Workshop 3: The objective was to develop NBS in Vuores and collect good practices that could possibly be transferred to Hiedanranta area development. Identifying the real needs of the different stakeholders involved, empathizing especially with the point of view of citizens. Testing the ideas found in the first and second workshops.

Reaching the goals

In all workshops the city's goals were reached.

Workshop 1: The first workshop produced a lot of experiences from the residents and other users and insights from the experts and could open the discussion between different participants. Most of the ideas communicated with the NBS either directly or indirectly.

Workshop 2: In the second workshop, the city was able to educate both the pupils and the teachers about NBS in Vuores. They also gave the pupils tools to monitor water quality and biodiversity and received plenty of good ideas for further development of NBS in the area.

Workshop 3: In the final workshop, the participants' views were tested on the existing NBS in Vuores. The workshop produced plenty of good ideas for further development of NBS in the area.

Lessons learned - tips to reach the goal

In general having a project team with expertise both in NBS, stormwater management and green spaces and also in service design and design thinking was essential in order to plan and execute a co-creation process that gives useful results for NBS and green spaces and for the stakeholders involved. Lessons learned from the workshops:

- Present the task and information in understandable and playful format, since the NBS as a theme may sound a bit hard to contribute as a resident. The presentation of the NBS in the very start of the workshop as well as the playful method made the barriers lower.
- Even if you are presenting to young audience, keep the content of your speech professional instead of childish or playful. According to the teachers, children appreciate this approach.
- It was beneficial to organize co-creation events as a part of a bigger event. You get more participants in that way. It was really useful to carry out the final workshop as a walk to the area. In that way you get more concrete idea of stakeholders' views.

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6.1.7 Expectations

Expectations of the city

Workshop 1: Expectations were met but not entirely. The organisers were afraid not to get enough residents, since most of the enrolled participants were experts or active members of NBS related NGO's. However, residents participated without enrolling to the workshop, which this time was a positive surprise. Also the method worked even better than we expected, and the participants seemed to be very interested of the expert introductions and next workshops as well.

Workshop 2: Expectations were met. The children had taken on board important lessons from the speeches and integrated these in their designs.

Workshop 3: Expectations were met. The participants of the nature trail were highly keen on it, and due to this interactive component it took longer to walk thought the trail than anticipated. There were also good discussions in the UNaLab stand (Figure 10), and the sample of water insects gained a lot of attention

Expectations of the participants

Workshop 1: The expectation was to share experiences of NBS, improving NBS and receiving information about the solutions as well as future development of the area. Participants stated they appreciated the possibility to participate, which they thought was important, and liked the method that was used. One participant said walking in Vuores was going to be a new experience after receiving the information of the NBS.

Workshop 2: It was difficult to anticipate the expectations of the children. But in the end, both the pupils and the teachers now have even a better understanding in how special a place they live and work (teachers).

Workshop 3: Participants expected to get to know more about the stormwater management at the area, biodiversity and local planning. This expectation was met, because participants of the nature trail learned more of the existing NBS in Vuores and also shared their views on the NBS.

6.1.8 Commitment to follow up

In general, Vuores has very active residents and the area is a very attractive platform for participation. The participants were interested to know afterwards how the ideas have been implemented. They are also keen in taking part to planning area's nature trails, beaches and docks. Some of the NGOs came to the Hiedanranta workshop, too, showing commitment.

Teachers and pupils started to monitor water quality and biodiversity in May 2018 and this activity is planned to be conducted twice a year. The pupils will have water monitoring back bags which include equipment needed to monitor water pH, temperature, turbidity and oxygen. Experts will give advice where to begin and how to report the results. The results will be used to evaluate the impact of NBS.

Figure 10: Testing in Vuores (TRE)

6.1.9 Impact

The impact of the workshops was learning about the local solutions, what kinds of NBS exist in the region, of biodiversity in the region. Participants will also feed in to upcoming activities – the outcomes of the workshop will help frame future trainings and materials designed to help them in setting up their ULL. The pupils were also monitoring biodiversity between the second and the third workshop and got to present the generated results in the third workshop. Participants all get the experience of having influence on local planning of the NBS and recreational areas.

Co-creation with stakeholders resulted in changes to planned actions. Hopes for wilder nature (e.g. selection of plants) and encouragement of physical activities and accessibility (e.g., building duckboards) were taken into account when planning Vuores NBS and surrounding parks. Vuores residents were interested in local water quality, and online monitoring will give them more information about that. First online measurement results are available for public in internet. Demand for NBS info has be fulfilled by making info signs to NBS sites and providing NBS info online (www.tampere.fi/unalab). Online information is especially targeted for communities applying for funding of plot scale NBS.

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6.2 Workshops Tampere -Hiedanranta

6.2.1 Participants

Workshop 1: Total of participants was 24; 17 external participants + 7 representatives from the city of Tampere, Regio Hub and VTT. 2 facilitators from Regio Hub, 2 facilitators from the City of Tampere.

Workshop 2: 44 including 2 facilitators from Regio Hub

Workshop 3: 18 including 2 facilitators from Regio Hub, 4 experts from City of Tampere, 1 expert + 1 trainee from Ramboll + 10 citizens

6.2.2 Participant involvement

Workshop 1: Participants were quite equally engaged in the discussions in all three rounds.

Workshop 2: Everyone present after lunch was involved in the group discussions (Figure 11). In one of the groups there was one participant who was more dominant in the discussion. The discussions appeared bubbly and innovative.

Workshop 3: Everyone was involved in the discussion. Some participants talked more one-on-one (as they were being interviewed) and some in the bigger group.

Lessons learned - tips to get people involved

In general, it's good to arrange workshops as a part of a bigger event. In that way there will be more participants. High quality educational materials of NBS and presenting the future plans of the area help participants to contribute. Maps, pictures and plan of the area are useful as a base for discussion. It's important in forehand to plan communication of the co-creation results to different stakeholders. We also recommend organizing guided walking tours as a part of Design Thinking process.

6.2.3 Outcomes

Workshop 1:

Intangible: Visions for NBS solutions in future Hiedanranta

Tangible: Post it notes, flip board papers etc. written material produced by the participants

Workshop 2:

Intangible: Concrete ideas for NBS in future Hiedanranta

Tangible: Written material produced by the participants

Workshop 3:

Intangible: Refined ideas and suggestions where they could be demonstrated

Tangible: Regio Hub will write a lot of notes based on the conversations and observations during the walking tour. Photos taken at the most interesting spots or otherwise relevant to the discussions.

6.2.4 Ideas collected

The city collected dozens of ideas, most of which are new, due to the phase of the planning process. The best ideas combined the industrial heritage of the area with innovative NBS and included a participatory approach.

The best ideas were the ones that took the visions to a more concrete level such as “preserving the cultural heritage of gardening in Hiedanranta” (vision) → “Hiedanranta seed mixtures to be given to people interested in urban gardening in the area” (concrete idea); "There should be new use for old industrial buildings" → "Outdoors bouldering wall". Other examples include thoughts about storm water management on building lots, the benefits of using moss on green roofs and using old tree trunks as a base for mushroom plantation.

Most of the ideas were complementing or refining the previously co-created ideas. The best ideas were the ones that could be connected to concrete locations on the area. For example, at Sellupuisto wetland: Although this wetland will probably not be spared as such in the future (as a tramline route is planned on it sometime after 2020), this could be a possible location for piloting some plant species which could be used in stormwater elements on the area; big rocks for sitting and children’s play to be placed close to the water; transplantable mat of forest undergrowth to treat the contaminated waters from old paper mill’s dump; beautiful perennial plants to NBS treating the contaminated waters; technique to prevent the smell of contaminated waters; old paper mill’s wastewater treatment plant should be retained and used for storm water treatment in future Hiedanranta.

Figure 11: Ideating in Hiedanranta (TRE)

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Summary of Hiedanranta ULL co-creation results:

- Recreation: Utilizing lake Näsijärvi and industrial heritage.
- Biodiversity: Valuable natural areas should be left unbuilt. Inner yards and buildings could belong to the blue-green network.
- Water management: Multi-functional blue infrastructure. Industrial history needs to be taken into account (treatment of contaminated waters, reuse of old wastewater treatment ponds (Figure 12)).

6.2.5 Controversial topics

- Efficient maintenance of the nature versus keeping the nature in natural condition.
- Guidance of the people to recreation versus spontaneous recreation.

The city did not notice any pressing discussions during the workshop. This is probably because the participants were professionals and got to choose themselves the topic they focused on.

There were differing opinions about how much free or not so detailed planned space should be left on the area once it's fully constructed. The citizens seemed to prefer more free space for "blooming biodiversity" than some of the experts. Or at least the experts tried to explain why they (alone) cannot guarantee that kind of free spaces would be left on the area even though they would be implemented in the planning process. The same kind of topic had previously come up in the first workshop as well.

6.2.6 Goals

Tampere organised workshops in both locations of their UNaLab projects. On the one hand the goal was to increase awareness of NBS, and how they can solve problems, and on the other hand to hear the views of the citizens to how their neighbourhood and city should be developed from viewpoint of NBS.

Workshop 1: The goal of the first workshop was to co-create ideas and vision(s) for NBS.

Workshop 2: In the second workshop, the ideas from the first workshop were brought to a more concrete level, hoping to spark some new and concrete ideas for NBS in future Hiedanranta.

Workshop 3: The third workshop was aimed at developing the ideas from the earlier workshops further, hearing citizens' opinions of them.

Reaching the goals

In all workshops the city's goals were reached.

Workshop 1: The first workshop produced plenty of ideas and visions were formulated based on them.

Workshop 2: The second workshop was an opportunity to present the visions. The participants created many wonderful ideas, which help the City of Tampere to make those visions become reality.

Workshop 3: In the third workshop in Hiedanranta, the active discussion with the participants and adequate notes and photos helped to reach the goal.

Lessons learned - tips to reach the goal

In general, having a project team with expertise both in NBS, stormwater management and green spaces and also in service design and design thinking seems essential in order to plan and execute a co-creation process that gives useful results for NBS and green spaces and for the stakeholders involved.

- Good preparation of materials and keeping the focus on the subject. High quality educational materials of NBS and presenting the future plans of the area help participants to contribute. It's important in forehand to plan communication of the co-creation results to different stakeholders.
- Using different kind of maps during the tour helps both the participants and organizers.
- It is beneficial to organize co-creation events as a part of a bigger event. You get more participants in that way.

6.2.7 Expectations

Expectations of the city

Workshop 1: Expectations were met, but of course one could always have more time and go deeper especially in the idea / vision creation phase.

Workshop 2: Expectations were met. Even though some ideas weren't developed that far, professionals bringing them up in the same way as the local citizens and NGOs had done in the first workshop, tells us that they are still interesting ideas.

Workshop 3: Expectations were met. There were enough participants and they had high motivation for co-creation. We reached our goal and enjoyed organizing this walking tour.

Expectations of the participants

Workshop 1: Participants expected to share thoughts about urban nature in future Hiedanranta and learning something new. After the workshop the city received positive comments about expanding the knowledge about NBS. Participants also thought that discussions were good due to the awareness of participants about the subject.

Workshop 2: Expectations were similar: Sharing thoughts, learning new points of views and giving their input for NBS in future Hiedanranta. The city again received positive feedback from the participants afterwards. They thought the whole event was a success.

The organisers hope the workshop did meet the participants' expectations, even though many of them seemed to have been able to continue discussing the topics longer than there was time. The key message they took home was that NBS solutions must be thought about when planning new urban areas and one should be creative and brave with their thoughts.

Workshop 3: Most of the participants were expecting new information and possibilities for co-creation. Based on the conversations the organisers had with some of the participants, while eating sandwiches at the mansion, the walking tour had met their expectations. It had given them new information, inspiration and of course some fresh air and the opportunity to chat with other citizens and experts.

6.2.8 Commitment to follow up

In general Hiedanranta is a very attractive platform for participation. Based just on the level of excitement, the level of commitment could be quite high.

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6.2.9 Impact

In Hiedanranta, the impact was similar to Vuores, learning about possible NBS in the area but also creating vision. It gave participants a chance to have an influence on planning of the area. It gave experts concrete ideas for NBS to be applied in their professional work elsewhere as well.

Co-creation with stakeholders resulted in changes to planned actions. New demo (Action 5 - pilot scale NBS to manage storm waters from contaminated site) was introduced as in co-creation recreational value of lake Näsijärvi was highlighted and smells from old industrial fibre waste were seen to hinder that value. Local biochar producer participated co-creation process and therefore his expertise and products were used in the demonstration.

The need of a green roof demo was highlighted in Hiedanranta in co-creation, as one of the ideas was to connect inner yards and buildings to the blue-green network of the area. Some ideas collected in Hiedanranta co-creation were passed to city planners (e.g., use of industrial heritage, leaving valuable biodiversity areas unbuilt) as master plan of the area is currently being developed, and many NBS will be implemented after UNaLab project time (next 5-10 years).

Figure 12: Old Hiedanranta pulp factory and its water treatment plant (TRE)

6.3 Workshops Eindhoven

6.3.1 Participants

There was a core target group of 14 participants for all workshops. In first workshop all 14 attended, the second had 10 and the third 9 participants plus 8 visitors. The number decreased because of planning and scheduling difficulties.

6.3.2 Participant involvement

Everyone present was involved and the atmosphere was 'safe'. In the first workshop, some participants were hesitant about the logic of their presence, but this changed during the workshop. In the second workshop, the re-definition of the challenge (Figure 13) was an exercise that showed some difficulty. Some participants were very hesitant to show their ideas by drawing, at the end of this workshop. In the final workshop, the benchmark exercise ignited their minds: it was a relief to see that so many things already are possible.

Figure 13: Participants reframing the questions (M. Bielderman, 2018)

Tips to get people involved

- Make sure you have good information in your invitation, about the subject and the reason you invite people, and make sure your invitation is in the right tone for your audience. Use existing networks to find participants, maybe let someone else 'sell' the story.
- If participants show hesitation about their presence, discuss this in the group.
- It is better to have less and longer workshops, or schedule them closer in time. This saves you the time get everybody back on track.

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6.3.3 Outcomes

Workshop 1:

Intangible: Feeling of being a group that is exploring the subject (Figure 14), accepting the challenge; curiosity

Tangible: Definition of NBS; timeline; stakeholder map; list of questions and who we want to ask those questions; board with reframing of the question: what is the challenge

Workshop 2:

Intangible: Tackling the challenge together; creativity

Tangible: A clearer view of the challenge and the directions to find solutions

Workshop 3:

Intangible: Finding a solution together, shared insight in how the disciplines can support each other in this explorative phase of implementing NBS in Eindhoven

Tangible: A product, event, service, that helps the implementation of NBS in Eindhoven

Figure 14: Participants exploring the subject (EIN)

6.3.4 Ideas

Ideas started to form in the second workshop. That workshop concluded with a wall full of ideas for solutions to tackle the challenge: aimed at raising awareness; at linking NBS with ordinary/real world; at support of experts, designers and planners. In the third workshop, the group clustered ideas in concept directions. Ideas at different levels but also connected: the ideas sometimes need each other to work. The group learned from other domains by looking at

benchmarks about how data can be analysed, how multiple disciplines can support each other, how you make complex and hard to imagine environmental elements tangible and experiential. Finally, these lessons were used to enrich and specify our own ideas. These ideas were presented to a group of stakeholders at the end of the third workshops, to test them and get feedback.

The *first idea* was to make a clear formulation and visualization of ambitions for all phases and stakeholders of plans to avoid deterioration of ambitions. The feedback on this idea was that it is clear that this ambition overview can be an enabler for anybody involved in projects to make plans, prioritize and align. The big question was, would the NBS story get weaker when integrated with other topics? Or would it help to get focus?

The *second idea* was a campaign for 'Eindhoven Green & Healthy', to create awareness amongst citizens, by letting them experience living in a healthy and green city, in playful actions and activities. The feedback was that actually experiencing NBS effects is crucial; give examples both big and small; link it to Living Labs and ambitions.

The *third idea* was 'The NBS success & failures experience - for a learning organization and city' with a physical tour through the city, a virtual tour with short movie clips, a train the trainer guide, linked to TNS/ sustainability/ climate. The feedback from the stakeholder was the necessity to join in with other initiatives within the organization and city to come to one integral package; also not only focus this on the city organisation but involve the whole city. And at the same time, keep it simple.

6.3.5 Controversial topics

- One important discovery was that the actual building and maintenance of the NBS was in a very small corner of the stakeholder map that the group compiled. This phase is important but not well represented in practice.
- One new topic was the organisational challenges at the municipality; about the right 'podium' to make choices
- The concept that summarizes the city's ambitions on NBS into measurable and simple requirements for different locations in the city: everybody acknowledges that this is needed to make multiple ambitions actionable, but at the same time questions come about the need to combine multiple ambitions. It seems to overcomplicate but at the same time it is an effective way to avoid trade-offs and deterioration of ambitious plans during implementation. What excited the participants most, was the idea of an event, to share both successes and failures about implementing NBS.

6.3.6 Goals

The city of Eindhoven organised three workshops in a co-creation process with professionals, to explore NBS in Eindhoven and to find ways to improve the process of implementation. In the first workshop, participants looked at the definition of the challenge of implementing NBS. The second workshop was focused on discovering and understand further the challenge of implementing NBS. In the third and final workshop, ideas to tackle the challenge were defined and ideas tested.

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Reaching the goals

The city reached the goal of the workshop. Particpants researched the topic, put things in perspective, and together they defined the challenge that they wanted to tackle in this series of workshops. They further specified their ideas to be able to brief people for further development. Also they have explored the possibilities for a community of practice. There will be a follow up meeting later in the year.

Tips to reach the goal

- It is a subject that leads to very interesting discussions, but be careful of your time and keep the focus in mind.
- Be sure to keep track of time.
- To really redefine the challenges and collect many ideas for solutions, make sure that there is no hesitation to voice an opinion.
- Ensure to work on two parallel tracks: explore ideas and content & explore ways to cooperate in implementation at the same time. Otherwise you will end up with nice ideas and little chance to follow up.

6.3.7 Expectations

Expectations of the city

For the city, expectations were mostly met. The group defined and redefined challenge and put together a long list of solutions. The group has come up with nice ideas and by having the workshops we formed a group of experts who are committed to get started. As a result of the workshops, we have met the expectations to form a Community of Practice. At the same time, we realize that organizing the sessions differently (less sessions, longer, less time in between) would have enabled even better results.

Expectations of the participants

The expectation was to learn more about NBS, and to find out how to implement them more often; to see other people's points of view about this. The participants got a better idea of the subject and the challenge the city faces. They feel part of a group that works on the implementation of NBS.

In the second workshop, participants expected to get a better focus on the challenge, find ideas for solutions to the challenge. The participants got a better idea of the total challenge the city faces, by redefining some smaller challenges. Participants left with the knowledge that solutions are there, but have to be worked out in more detail and tested to see what could really work.

For the final workshop, the participants consisted of two groups: the core group of the earlier workshops and a group of visitors that acted as panel to test and validate ideas. The core group expected to elaborate on NBS and how to work together on implementing NBS. The visitors expected examples of NBS in city context. Although some visiting experts expressed that they expected just to see NBS ideas, after the meeting all people attending have committed to organizing a first Community of Practice event together and they look forward to working together.

6.3.8 Commitment to follow up

About 80% of the participants followed up after the first workshop and returned the second and third workshop. We had enough useful feedback from the interviews. People were quite enthusiastic. All participants of the third workshop are committed to forming the Community of Practice and proceed the work on NBS.

6.3.9 Impact

The impact of the workshop for the participants was to learn more about NBS and especially the challenges in implementing these NBS in the city. They got the chance to be part of a Community of Practice of NBS. For the city, the impact is to have a group of ambassadors that know about NBS and the implementation and are committed to work on it.

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6.4 Workshops Genova

6.4.1 Participants

The city aimed to have around 40 participants each workshop. In the first and second workshop they had 15 participants, in the third this increased to 25 participants. The Municipality has invited more than 50 people, hoping that 40 will take part to the workshops. At the workshop meetings, from 15 to 25 people have participated.

6.4.2 Participant involvement

All the participants were given the opportunity to express their vision and comment on proposals of other participants (Figure 15). In the second workshop, it turned out that some of the participants intervened only after being asked directly by the facilitator. In the third workshop, some participants inserted more cards since they knew the project better.

Figure 15: Participation (GEN)

<u>Tips to get people involved</u>

It is important that people from public administration take part directly, both technicians (essential) and politicians.

Use of 'hot' communication: each participant was contacted by phone after the mail invitation to explain the context and help to identify the representative to send. Also, it is useful to send information material before the workshops.

Beyond the room workshops, it should be interesting to involve the participants in site activities, managed and supported by planners and technicians.

6.4.3 Outcomes

The stakeholders are now more informed about the project and the next steps. They felt more involved and heard by the municipality and they have given a real contribution to the project implementation (Figure 16). The stakeholders have also had the possibility to speak with the others and compare their ideas. The possibility to speak and work also with the municipality is very important for the stakeholders.

6.4.4 Ideas

Everybody introduced at least three ideas each, which were divided in seven clusters from which were drawn five common visions. The most interesting idea was the one about water valorisation in all its forms, both as aesthetic factor and as connection to the neighbourhood name. At the end, three ideas were selected, all expressed in several actions. In the final workshop, the main themes of the previous workshops were re- discussed; some good new ideas emerged, like windbreak hedges; mobile restoration points; S.O.S. points connected to the local police.

6.4.5 Controversial topics

Workshop 1: no particular difficulties, but the main discussion was about the possibility to subdivide the park in thematic areas (for children, for elderly, for dogs) or else to maintain the homogeneity.

Workshop 2: several critical points emerged, sometimes with a censorious approach by the technicians. From the beginning, some technicians asked what was intended with 'actions' and went as far as to question the point of the workshop.

Workshop 3: the most controversial topics were access to the park, discussing new accesses, to have gates or not; lifts, stairs and new streets; safety and security presence; management and maintenance.

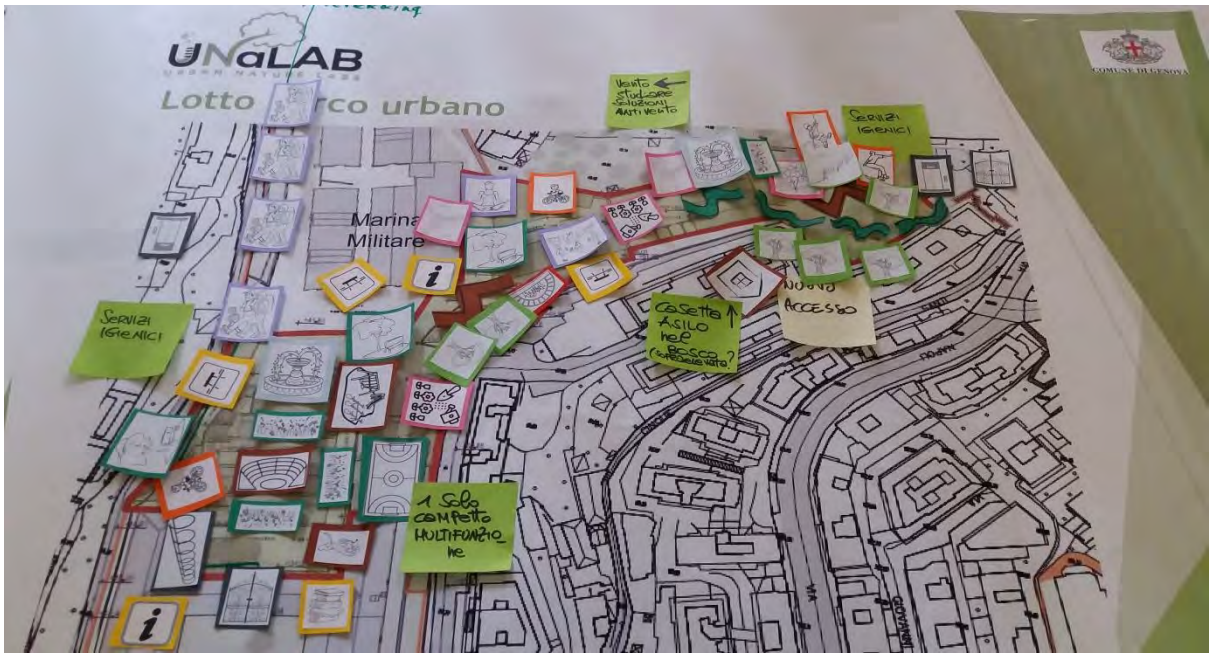

Figure 16: Workshop outcome: map of the site (GEN)

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6.4.6 Goals

In Genova, the workshops were dedicated to the re-development of the Plan for Gavoglio Barracks located in the centre of Lagaccio district. The first workshop's goal was to obtain a common vision on the possible park development project to the light of the site features and environmental restrictions using NBS. In the second workshop the city aimed to elaborate project ideas and Nature Based Solutions for the urban park, on the basis of the common vision generated in the prior workshop. In the third and final workshop, participants worked on the park layout inserting the different functional elements with pre-prepared cards and building a shared layout.

Reaching the goals

In the first workshop, the goal to give information about the state of the project and to get a common vision was reached. After the presentation of the tables' visions many common elements were found and a common idea was drawn.

In the second workshop, the goals were met only partially. The idea sharing didn't go well because of the censorious approach of some participants.

In the third workshop, the goal was achieved of creating on paper a shared layout where all the functions and elements were chosen, inserted and explained. The practical work with the technicians allowed the group to translate their ideas into actual planning.

Tips to reach the goal

- In order to allow everybody to express his opinion and generate a constructive discussion, it could be useful to calculate beforehand a time coefficient to match participation at a table and disposable time so as not frustrate the participants involvement;
- To choose the involvement methodology according the goal, even mixing different techniques and tools. To prepare and train the technical personnel involved in mediating and talking with external players. The facilitators must be impartial arbiters and they must be supported financially.

6.4.7 Expectations

Expectations of the city

Workshop 1: the city's expectations were met, because the participants got the spirit of the meeting and cooperated positively and pro-actively to reaching the goal.

Workshop 2: this workshop didn't go entirely according to the city's expectations. In particular a more active role was expected from the Municipality technician who should have presented a series of possibilities within which to make proposals.

Workshop 3: expectations were met, because there was a lot of participation in the working group.

Expectations of the participants

From an informal data gathering at the end of the first workshop, was clear that the participants considered their participation to the decision process positively and were willing to take part in the further stages of the project. The second workshop matched only in part the participants' expectations, producing some frustration. Fortunately, the third workshop did meet the participants' expectations, since they could work on concrete ideas using the layout and the cards.

6.4.8 Follow up

Nearly all the participants were interested and willing to take part in the next stages of involvement in the project.

6.4.9 Impact

The impact of the workshops was that active citizenship was encouraged, the citizens were involved in decisions. Participating in the workshops created a reciprocal trust. Participants obtained knowledge and know-how about NBS and the project. Each workshop also had its own impact on participants:

- Workshop 1: To gather suggestion on the urban park planning;
- Workshop 2: To take part actively in the planning of the park;
- Workshop 3: To define needs and deciders on which to build the final project.

6.5 Comparing the cities

This paragraph contains a general overview of the results of the workshops.

Participants

The choice for participants was very different in the three cities, each choice a consequence of the goal of the workshops. The choice worked out quite well, resulting in a satisfying involvement. In all cities, the gender of the participants was balanced, close to 50/50. The subject of the workshops attracts male and female participants equally, and no difference was made in the selection, invitation or involvement of either.

In *Tampere*, very different groups participated in each workshop: all kind of people connected to the sites, including children (Figure 17), passers-by, people joining in a nature walk, but also experts from the city and agencies explaining NBS. In *Eindhoven* the group consisted of only professionals; citizens are involved through other processes of co-creation. In *Genova* the group was a combination of people from the city, citizens and experts of various fields.

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Figure 17: Children monitoring (water insects) in existing NBS of Vuores (TRE)

Involvement in discussions was in general not difficult in both areas in *Tampere*. In Vuores, the children showed different levels of involvement, but the shy children got some extra encouragement. Some visitors of the information stands only observed what was going on.

In *Eindhoven*, the atmosphere proved to be safe for discussions, so everybody could be involved.

In *Genova* also, everybody was given the opportunity to express visions and give comments. In one case however, some of the participants intervened only after being asked directly by the facilitator.

The best tips to get people involved, from all cities:

- Play a game
- Adjust the length of the talks in your workshop to your audience, especially for children
- Connect the workshop to an existing (popular) event
- Go on walking tours
- Give good information in invitation
- Work with maps
- Give extra explanation by phone, after the first email invitation
- If participants show hesitation about their presence, discuss this in the group
- Responsible people from the city should take part directly
- Beyond the workshops, involve the participants in site activities, managed and supported by planners and technicians

Outcomes:

In all cities, the workshops resulted in sharing of views and finding ideas, mostly on paper (Figure 18). In Eindhoven and Genova also groups were formed.

Tampere: opinions, experiences, visions, ideas; on for example drawings and cards, papers and photos; some documentation of conversations.

Eindhoven: group forming, defining NBS, finding solutions for better implementation; results on paper.

Genova: also group forming, working on design; useful points of view from qualified people.

Figure 18: Discussion around the map in Genova (GEN)

Ideas:

All cities got a decent amount of ideas out of the workshops. All ideas were very specific to the location and theme.

Tampere: Very practical ideas for the locations; ideas of combining NBS with cultural heritage; making visions concrete on location

Eindhoven: Specific ideas for raising awareness; linking NBS with ordinary/real world; support of experts, designers and planners

Genova: specific ideas for the project design; water as aesthetic factor and as connection to the neighbourhood name.

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Controversial topics:

The topics discussed were sometimes controversial, but in very different ways.

Tampere: participants expressed fears for environmental quality and maintenance of nature after building; how much freedom can be left in the design for natural processes.

Eindhoven: participants discussed the difficulty of combining ambitions in city projects and processes; and various organisational challenges.

Genova: there was some discussion about point of the workshop; specific to the project location discussion was about the future accessibility of the park, management and maintenance.

Reaching the goals

In general, the goals of the workshops were similar, and they were met in the realisation.

Tampere organised workshops in both locations of their UNaLab projects. On the one hand the goal was to increase awareness of NBS, and how they can solve problems, and on the other hand to hear the views of the citizens to how their neighbourhood and city should be developed from viewpoint of NBS.

The city of Eindhoven organised three workshops in a co-creation process with professionals, to explore NBS in Eindhoven and to find ways to improve the process of implementation.

In *Genova*, the workshops were dedicated to the re-development of the Plan for Gavoglio Barracks located in the centre of Lagaccio district. The sharing of ideas was sometimes challenging.

Tips for reaching the goals, from all cities:

- Keep it simple but professional
- Prepare materials and maps; facilitators and mediators
- Mix techniques and tools
- Be sure to keep track of time, keep focus in discussions, control 'speaking time'
- To really redefine the challenges and collect many ideas for solutions, make sure that there is no hesitation to voice an opinion.
- Ensure to both explore ideas and explore ways to cooperate in implementation at the same time - to increase the chance of a follow-up

Expectations of the cities:

The cities' expectations of the workshops were mostly met. In *Tampere* even more participants joined than expected. Citizens and professionals had similar ideas, which was an unexpected positive outcome. Walking around together on location worked well. In *Eindhoven*, organisers realised that organizing the sessions differently (less sessions, longer, less time in between) would have enabled even better results. *Genova* reported that participants generally got the spirit of the meetings and cooperated positively and pro-actively to reaching the goal. Only in the second workshop, discussions did not always work out as expected.

Expectations of the participants:

Feedback from the participants in all three cities was very positive. In *Tampere* they specifically liked the method. 'Walking around on location will be a new experience with the extra information'. Walking around together was a nice inventive way to exchange information. The professionals joining the *Eindhoven* workshops got a better idea of the subject and the challenge the city faces. They now feel part of a group that works on the implementation of NBS. In *Genova*, the participants considered positively their participation to the decision process and were willing to take part in the further stages of the project.

Follow up:

The commitment to follow up between and after the workshops was good, for different reasons. In *Tampere*, residents are already active and they want to know about implementation. School pupils will continue monitoring water quality. In *Eindhoven*, participants are committed to forming the Community of Practice and proceed the work on NBS (Figure 19). Also, in *Genova*, most participants were interested and willing to take part in the next stages of involvement in the project.

Figure 19: Processing workshop results (EIN)

Impact:

The impact from joining in the workshops was very similar in all cities. All participants have now learned about NBS locally and worked on creating vision. *Eindhoven* aimed at and succeeded in finding ambassadors for NBS in the city. For both *Tampere and Genova*, joining the workshops resulted in having influence on planning. *Genova* mentioned specifically that joining the workshops created trust between stakeholders. In *Tampere*, participants from the school are joining in the monitoring of NBS.

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7. CONCLUSION

7.1 Summary of achievements

UNaLab front runner cities Tampere, Eindhoven and Genova have all organised series of co-creation workshops to study the exploration and implementation of NBS, together with stakeholders, as a starting point for the Living Labs they will develop on their UNaLab project locations. The approaches they had for the workshops were quite different because the UnaLab test locations for the three cities have their own scale, character and nature. This resulted in a mix of techniques and a broad array of results. Fortunately, all workshop series were successful in exploring the subject and finding solutions for implementation.

Tampere distributed flyers and a pre-questionnaire; they used various channels such as mail, magazines, and existing communication channels in the city and the neighbourhood. Genova used existing databases to attract people and gave people extra information in personal phone calls. In Eindhoven, the organizers also used the existing system and networks to invite participants.

In total, 361 stakeholders participated in the workshops, an average of 30 per workshop. Parties involved were professionals and/or experts, NGOs, local government, provincial government, companies (e.g., energy companies, material producers, etc.), universities, local associations (e.g., housing), and citizens (e.g., residents). In Eindhoven, the gender of the participants was balanced, close to 50/50. The Tampere workshops had slightly more female participants (60/40) and the workshops in Genova attracted more male participants (70/30). The subject of the workshops should attract male and female participants equally, and no difference was made in the selection, invitation or involvement of either.

Figure 20: Walking tour in Vuores (TRE)

The techniques and tools that were used are boards, maps, cards, benchmarking, ideation templates, customer journey maps, stakeholder value mapping, themes & clustering, area scale

models, layouts of the area, discussions, NBS cards, design game, participatory design game and LEGO® serious play, walking tours (Figure 20), voting boards and an action track app.

Regarding the process steps in the workshop methodology, it seems that objectives were not always exactly matching the 'official' steps but somewhat tailored to the specific needs of the workshop. In the end, all workshops have reached the goal of creating an iterative process: each workshop follows the one before and feeds important information & adaptations to the next one.

7.2 Outcomes, tangible and intangible

In all cities, the workshops resulted in sharing of views and finding ideas, mostly on paper, in text, drawings and photos. In Tampere and Genova, participants produced ideas and wishes for the design. In Eindhoven and Genova also groups of 'ambassadors' were formed.

All cities got a decent amount of new ideas out of the workshops. All ideas were very specific to the location and theme. In Tampere and Genova, the ideas were specific for the design, in Eindhoven they were aimed at raising awareness and a link with the 'real world', how to share support among experts, designers and planners. The most striking idea in Tampere was the combination of NBS with cultural heritage. In Eindhoven, most striking was the 'NBS success & failures experience - for a learning organization and city' with a physical tour through the city, a virtual tour with short movie clips, and a train the trainer guide. The most interesting idea in Genova was water valorisation in all its forms, both as aesthetic factor and as connection to the neighbourhood name.

The topics discussed were sometimes controversial, but in very different ways. In Tampere, participants expressed fears for environmental quality and maintenance of nature after building; how much freedom can be left in the design for natural processes. In Eindhoven, participants discussed the difficulty of combining ambitions in city projects and processes; and various organisational challenges. In Genova, there was some discussion about the point of the workshop and specific to the project location discussion was about the future accessibility, management and maintenance of the park. The sharing of ideas was sometimes challenging.

7.3 Expectations and commitment

The cities' expectations of the workshops were mostly met. In Tampere more participants joined than expected. Citizens and professionals found agreement in their ideas, which was not expected. Walking around together on location worked well. In Eindhoven, organisers realised that organizing the sessions differently (less sessions, longer, less time in between) would have enabled even better results. Genova reported that participants generally got the spirit of the meetings and cooperated positively and pro-actively to reaching the goal. Only in the second workshop, discussions did not always work out as expected.

Feedback was mostly collected on the spot. Participants in all three cities were quite positive about the experience. In Tampere they specifically liked the used methods. To quote a participant: 'Walking around on location will be a new experience with the extra information'. Taking a walking tour as a group was a nice way to exchange information. The professionals joining the Eindhoven workshops got a better idea of the subject and the challenge the city faces. They now feel part of a group that works on the implementation of NBS. In Genova, the participants considered positively their participation to the decision process and were willing to take part in the further stages of the project.

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The commitment to follow up between and after the workshops was good, for different reasons. In Tampere, residents are already active and they want to know about implementation. School pupils will keep monitoring water quality. In Eindhoven, participants are committed to forming the Community of Practice and proceed the work on NBS. Also in Genova, most participants were interested and willing to take part in the next stages of involvement in the project.

7.4 Impact and lessons learned

An important aspect that varied in the cities was the familiarity with both co-creation and NBS at the start of the project. The starting point was different, but through and after the workshops, more people were familiarized with the two concepts, and differences between the cities are now smaller. In both Tampere and Eindhoven, co-creation has been a familiar concept for quite some time. There was also knowledge about NBS, but participants still had many questions. In Genova, at the start of the project, the city and participants were not very familiar with NBS nor co-creation. In all cities, the workshops were helpful to align definitions and collect solutions with several stakeholders. In the workshops both the people from the cities and the participants gained experience with and knowledge about co-creation and NBS.

Organising the workshops was an interesting learning experience for the cities, both to explore the subject of NBS and to work with chosen techniques. The impact from the workshops was actually rather similar in all cities. All participants have now learned about NBS locally and worked on creating vision. They had a positive experience with co-creation in city development. Eindhoven aimed at and succeeded in finding ambassadors for NBS in the city. For both Tampere and Genova, joining the workshops resulted in having influence on planning. Genova mentioned specifically that joining the workshops created trust between stakeholders. In Tampere, participants from the school are joining in the monitoring of NBS.

After the workshops, the cities had several tips for reaching the goals of the workshops:

- *Keep it simple but professional*
- *Prepare materials and maps; facilitators and mediators*
- *Mix techniques and tools*
- *Be sure to keep track of time, keep focus in discussions, control 'speaking time'*
- *Make sure that there is no hesitation to voice an opinion.*
- *Ensure to both explore ideas and explore ways to cooperate in implementation at the same time - to increase the chance of a follow-up*

To get people involved in the workshop process, the following tips were mentioned:

- *Play a game*
- *Adjust the length of the talks in your workshop to your audience, especially for children*
- *Connect the workshop to an existing (popular) event*
- *Go on walking tours*
- *Give good information in invitation*
- *Work with maps*
- *Give extra explanation by phone, after the first email invitation*
- *If participants show hesitation about their presence, discuss this in the group*
- *Responsible people from the city should take part directly*
- *Beyond the workshops, involve the participants in site activities, managed and supported by planners and technicians*

8. ACRONYMS AND TERMS(ALL)

8.1 List of acronyms used in UNaLab

Partners	
TEKNOLOGIAN TUTKIMUSKESKUS VTT OY	VTT
FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V .	FHG
GEMEENTE EINDHOVEN	EIN
COMUNE DI GENOVA	GEN
TAMPEREEN KAUPUNKI	TRE
STAVANGER KOMMUNE	STA
AYUNTAMIENTO DE CASTELLON DE LA PLANA	CAS
COMMUNE DE CANNES	CAN
INSTITUT PLANOVANI A ROZVOJE HLAVNIHO MESTA PRAHY	IPR
TC BASAKSEHIR BELEDIYESI	BAS
EUROPEAN NETWORK OF LIVING LABS	ENOLL
EUROPEAN REGIONS RESEARCH AND INNOVATION NETWORK	ERRIN
LAND ITALIA SRL	LAN
ENGINEERING - INGEGNERIA INFORMATICA SPA	ENG
M3S SRL	M3S
RAMBOLL MANAGEMENT CONSULTING OY	RAM
INNOHUB BV	INN
RINA CONSULTING (formerly D'APPOLONIA SPA)	RINA (DAPP)
INFRASTRUTTURE RECUPERO ENERGIA AGENZIA REGIONALE LIGURE I.R.E. SPA	IRE
FUNDACIO GENERAL DE LA UNIVERSITAT JAUME I FUNDACIO DE LA COMUNITAT VALENCIANA	ESP
HLAVNI MESTO PRAHA	PRA
TECHNISCHE UNIVERSITEIT EINDHOVEN	TU/E
UNIVERSIDADE DE AVEIRO	UAV
UNIVERSITAET STUTTGART	STU
LULEA TEKNISKA UNIVERSITET	LTU
HONG KONG POLYTECHNIC UNIVERSITY	HON

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UBATEC SA	UBA

Abbreviation	
Data Management Plan	DMP
Ethics Advisor	EA
European Awareness Scenario Workshop	EASW
Follower City	FC
Frontrunner City	FrC
Grant Agreement	GA
Information and Communication Technologies	ICT
Internet of Things	IOT
Key Impact Indicators	KII
Key Performance Indicators	KPI
Municipal Governance Guideline	MGG
Nature Based Solutions	NBS
Open Access	OA
Quality Management Plan	QMP
Roadmaps for Energy	R4E
Small and Medium Sized enterprises	SME
Systemic Decision Support Tool	SDST
Urban Living Lab	ULL
Urban Nature Labs	UNaLab
Work Package	WP

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