

## Replication Roadmaps for UNaLab Follower Cities

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# REPLICATION ROADMAPS FOR UNALAB FOLLOWER CITIES

## D6.7 Replication Roadmaps Report

07-06-2020

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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**



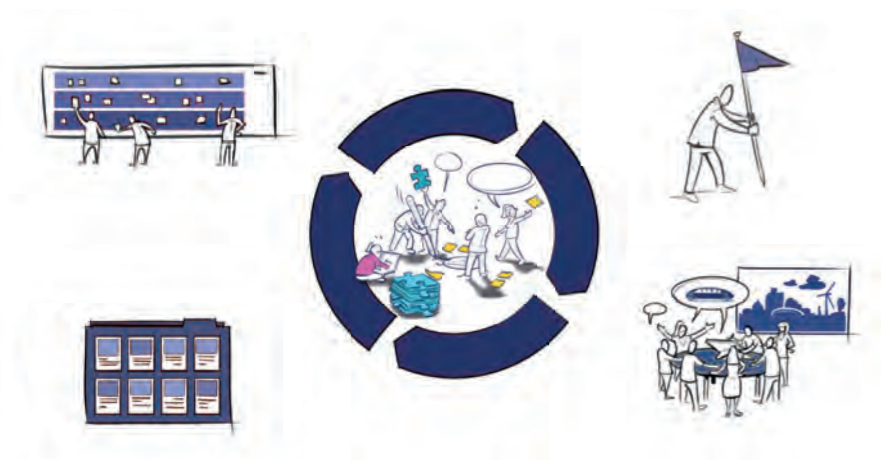
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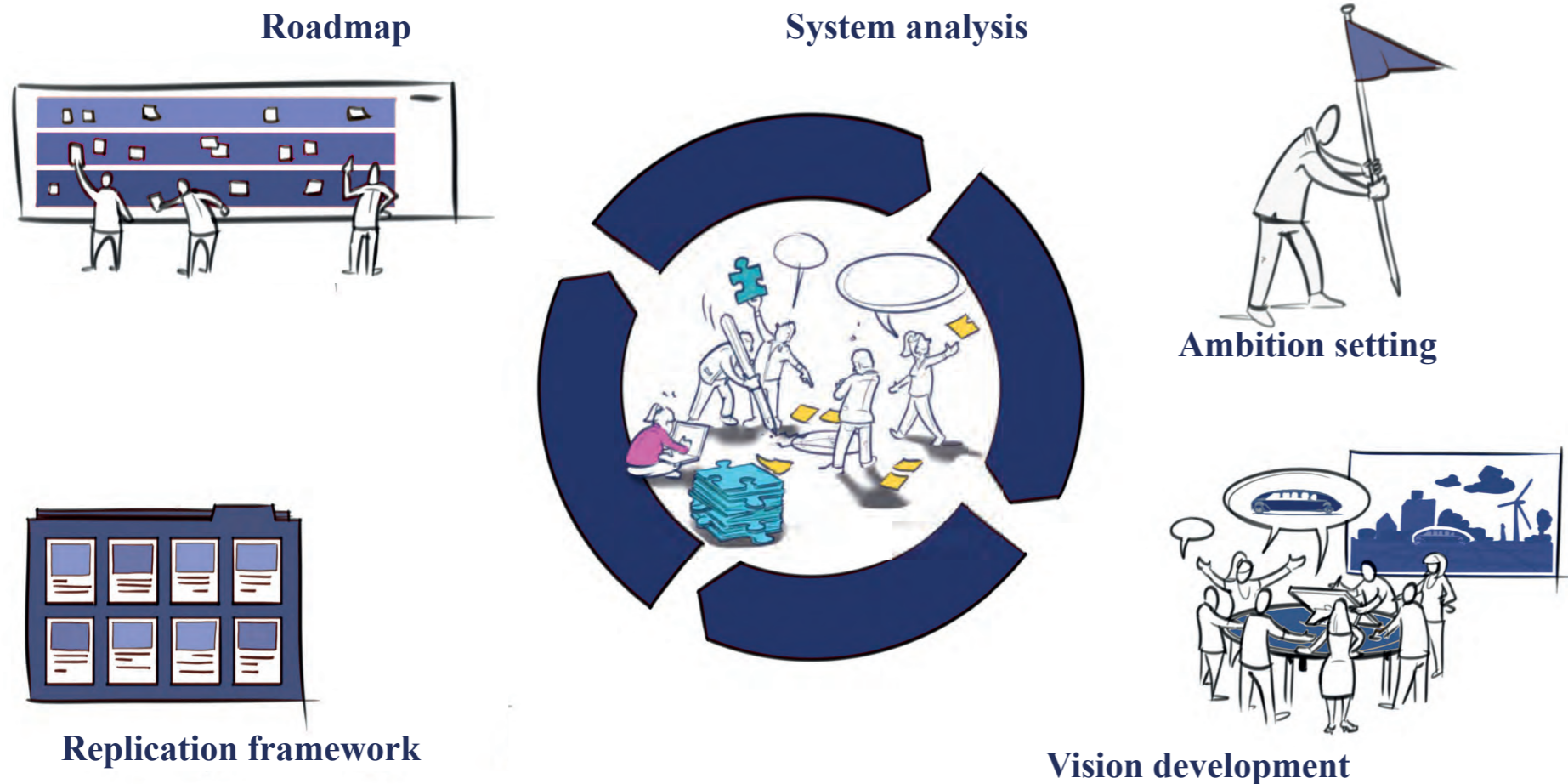




# Section I — Introduction



# 1. INTRODUCTION



## 1.1. Purpose and target group

To maximise the impact of nature-based solutions (NBS) for climate and water resilience, the UNaLab project builds on four supportive pillars: Replication, Exploitation, Dissemination and Communication. WP6 activities thereby focus on the replication part by developing an NBS Replication Framework. On the content side, this includes research and development on barriers to NBS implementation, as well as suitable strategies, tools and frameworks to overcome those, such as financing strategies, as well as governance and business models. On the conceptual side, different formats for knowledge management, training and strategy development are developed. Here, the focus is on matching demand and availability within the project.

One of the core activities of the WP6 is the replication of NBS in the so-called 'follower cities' – namely Stavanger, Cannes, Castellón, Prague and Başakşehir. These work together with the 'frontrunner cities', in which selected NBS are piloted, in a specifically designed set of activities, including training sessions, workshops, webinars, meetings and study visits. The exchange and the tools and knowledge in the replication framework should help the follower cities to develop and co-create their individual NBS roadmaps and enable local stakeholders and governments to learn from the UNaLab research and experiences. The outcomes, materials and feedback of this roadmapping process will be used to further improve and develop the Replication Framework and turn it into a knowledge and tool repository which can be used by all cities and interested parties beyond the project.

The present report is one of the UNaLab WP6 deliverables and focuses on the Replication Roadmaps. It builds on the system analysis, ambitions, and visions of the follower cities as reported in D6.5 Joint Vision Report. It contains a documentation of the Replication Framework (knowledge, material and methodology) that was used to create the Follower City Replication Roadmaps, as well as the individual roadmaps and outcomes themselves. The target group of this report consist of (among others):

- All stakeholders that were involved in the Follower City Replication Roadmapping process;
- Cities that are interested in addressing their climate and water resilience with NBS;
- Companies that offer NBS and related services;
- Knowledge institutes that perform research on climate and water resilience in cities;
- Stakeholders in cities that are concerned about and/or involved in projects to improve climate and water resilience.

## 1.2. Approach and methodology

The EU Follower cities Başakşehir, Cannes, Castellón, Prague and Stavanger, and the non-EU replication stakeholders Buenos Aires and Hong Kong are selected to represent differences in culture, urban structure, governance organisation and climate. They are widely geographically distributed. Their commitment to the UNaLab project ensures a widespread dissemination of project outcomes, translation of project deliverables to diverse social and cultural contexts and the potential for widespread transformative actions utilising NBS to enhance urban climate and water resilience.

The approach is characterised by four main elements:

- Backwards planning – the project starts with the development of a shared vision as a starting point for the creation of a well developed path to achieve the vision.
- Inclusive workshops in the cities – a cooperative process to engage key stakeholders (companies, citizens, public and private organisations and knowledge institutes) within the region in co-creating a clear and well-designed implementation plan with a stronger commitment to the joint effort in the realisation phase.
- Expert knowledge is sourced in a practical and usable form during the vision development and roadmapping processes.
- A visual language is used to easily connect people and share insights.

WP6 relies heavily on the involvement of local stakeholders. They are involved from the first steps (defining ambitions) in co-creation activities. These stakeholders include not only those who benefit from the NBS such as citizens themselves, but also relevant research and industry partners. Workshops are held in UNaLab follower cities to support each step of the roadmapping process. This facilitates the establishment of a local/regional community of practice, engaging key stakeholders in the development of clearly defined, comprehensive urban strategies for each municipality. Stakeholder participation is essential for a lasting commitment to long-term cooperation and shared of responsibility throughout the implementation of co-developed plans.

At the end of the roadmapping activities each UNaLab follower city has a sustainable urban strategy for climate and water resilience, consisting of a future image scenario, a roadmap and a handbook describing individual and joint projects to support the implementation of co-developed policies and measures to enhance climate and water resilience using NBS.

The UNaLab Roadmapping Process follows a 5-step approach (see figure

on page 6), including:

1. Systems Analysis
2. Ambition Setting
3. Vision Development
4. Replication Framework
5. Roadmapping

The report D6.5 (published in May 2019) covers step 1, 2 and 3. This report covers step 4 and 5.

The activities and results of building the Replication Framework and Roadmapping are described in more detail in the following sections.

### 1.2.1. Replication Framework

Section II describes the development of the Replication Framework. The framework integrates all relevant UNaLab deliverables in a process to develop roadmaps for NBS for climate and water resilience. Deliverables of other workpackages were used to create inspiration cards for NBS, as well as practical tools for implementing them, such as business and government models and financing options. The interim NBS technical handbook (D5.1) was used to identify suitable solutions as well as remaining needs. Through desk studies and interviews with experts in the field of NBS and future developments for climate and water resilience, the Technical Handbook was complemented by anticipated future innovations in NBS for enhanced urban climate and water resilience.

A workshop approach was developed to create city replication roadmaps for NBS, using the elements of the Replication Framework, which was then tested in the five follower cities in the next step. The Replication Framework forms the basis for the final online framework of the UNaLab project (D6.8) and will be also available for other cities beyond UNaLab.

### 1.2.2. Roadmapping

Section III presents the city roadmaps for NBS towards climate and water resilience in 2050 for the UNaLab follower cities Başakşehir, Cannes, Castellón, Prague and Stavanger. The NBS roadmaps were developed in a two-day roadmap workshop applying the Replication Framework with all relevant stakeholders in each of the UNaLab follower cities. The results of the vision development and system analysis in the cities were used to identify specific project opportunities for the short, mid and long term. In this way, the city-specific roadmaps bridge the gap between the starting position of each follower city (identified in the system analysis) and the desired future scenario (created in the vision development).

The outcome of the roadmapping activities was a suite of comprehensive roadmaps for NBS replication (one per follower city) tailored to the specific context of each city and containing a set of projects to be implemented. These projects were placed on a timeline to provide insight into the required steps, together with a set of clear milestones towards the desired future scenario. In accordance with the UNaLab Grant Agreement 730052, the full project proposals and collaboration plans of follower cities are not included in this (public) report.

The results were planned to be presented in a one-day Joint Roadmap Workshop with all the UNaLab cities (together with the M36 Steering Committee meeting), to enable the cities to learn from each other's roadmaps and identify opportunities for joint projects to implement relevant NBS and become climate- and water resilient. Unfortunately, the planned M36 meeting was postponed until M42 due to the global COVID-19 pandemic and subsequent government restrictions designed to limit the spread of the virus. The Joint Roadmap workshop will be replaced by a series of webinars planned for autumn 2020.







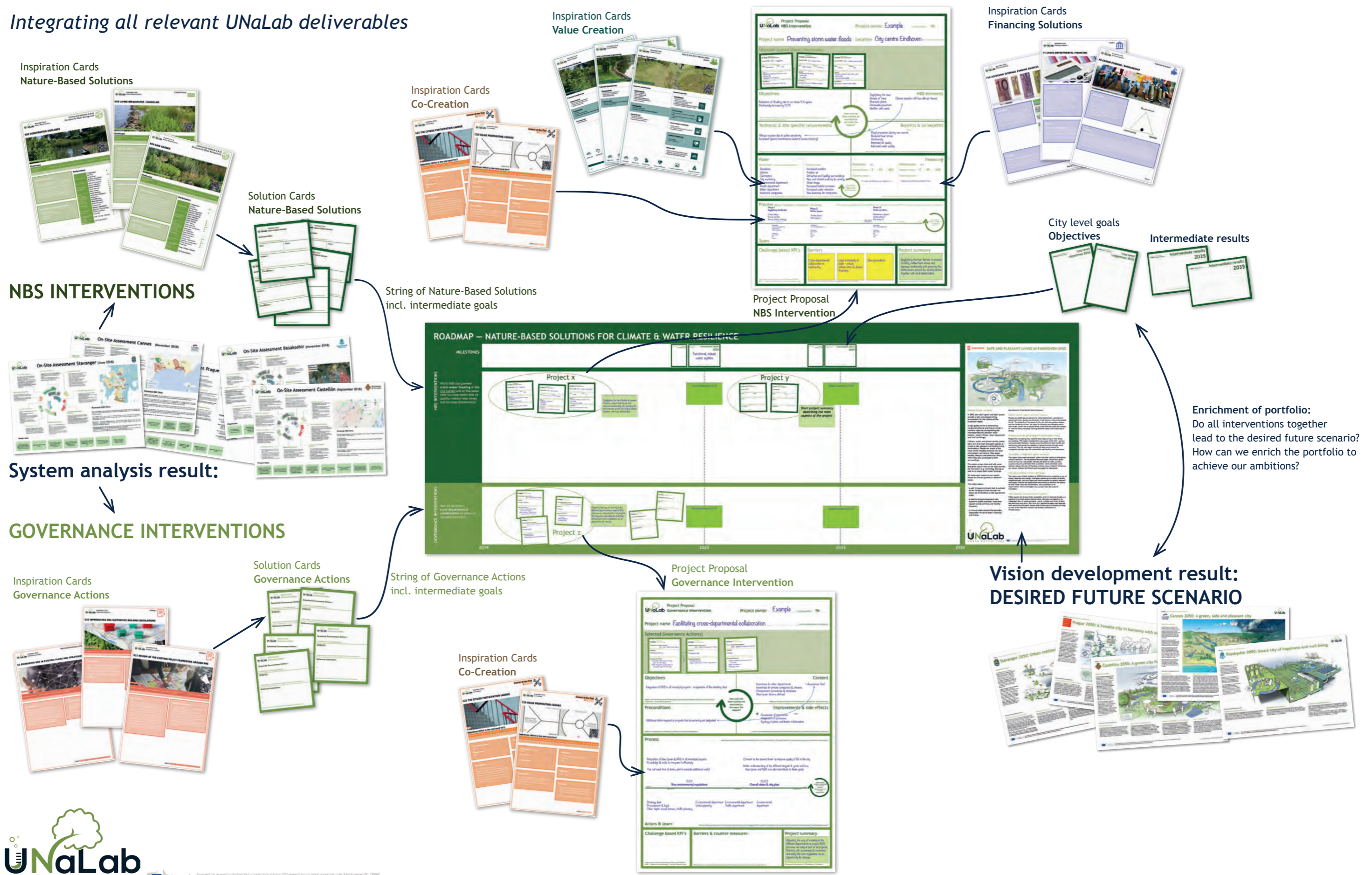


## Section II — Replication Framework



# ROADMAPPING – NATURE-BASED SOLUTIONS FOR CLIMATE & WATER RESILIENCE

Integrating all relevant UNaLab deliverables





## 2. DEVELOPING THE REPLICATION FRAMEWORK

### 2.1. Approach

The aim of this step was to develop the Replication Framework. The framework integrates all relevant UNaLab deliverables in a process to develop roadmaps for NBS for climate and water resilience.

In a number of working sessions Eindhoven University of Technology, (TU/e) Fraunhofer IAO and University of Stuttgart IAT have developed a draft for the Replication Framework based on the materials that were created or are being developed by the different work packages and partners in the UNaLab project. This draft Replication Framework was presented and discussed at the UNaLab steering committee meetings held in Başakşehir in November 2018 and in Prague in May 2019. This draft Replication Framework was improved and the related materials and templates were developed through several iterations.

A workshop approach was also developed to create a city roadmap for NBS, using the elements of the Replication Framework, and was tested in the five follower cities Başakşehir, Cannes, Castellón, Prague and Stavanger. The Replication Framework and workshop approach are also available for use by other cities beyond the UNaLab project.

The result is a Replication Framework and accompanying roadmap workshop that consists of the following elements:

1. Intervention areas, derived from a system analysis and vision development to define the desired future scenario
2. Inspiration cards, based on the deliverables of other work packages:
  - NBS
  - Governance actions
  - Value creation
  - Financing solutions
  - Co-creation
3. Templates to support the process in the workshops
4. A facilitators manual for the roadmap workshops

The integrated roadmap approach is shown on page 10. The next section describes the elements in more detail.

### 2.2. Intervention areas

To identify relevant projects for each city, we addressed specific, local challenges in each city. A system analysis was completed in the previous steps of the project (see UNaLab deliverable 'Visions of UnaLab follower cities' - D6.5 Joint Vision Report). The cities then defined their desired future scenario in the vision development. Using these two results,

applicable NBS interventions and governance interventions were co-identified as a starting point for the workshop.



Results of the system analysis



Desired future scenarios from the vision development step

#### 2.2.1. NBS interventions

An NBS intervention is a proposed way to address a climate challenge at a specific location. Each city identified relevant topics by formulating questions relating to specific challenges: "Which NBS can address [challenge] in [area]?"

The NBS interventions were prioritised by the city representatives, and a maximum of four interventions were selected for the roadmap workshop.

#### 2.2.2. Governance interventions

A governance intervention addresses necessary change to governance processes to support and enhance NBS implementation. Each city identified relevant topics by formulating questions like "How to...?".

It was possible to adapt the governance interventions after the first day of the workshop, based on the identified barriers in the NBS intervention project proposals.

### 2.3. Inspiration cards

The UNaLab project has created a number of relevant outputs to inspire participants in the roadmap workshops. Together with all work packages, an inventory was therefore made of material that could be used in the Replication Framework. The results were five sets of inspiration cards.

ERRIN created an online content management tool to be able to create the inspiration cards and add new cards when necessary. The online content management tool also allows for the cards to be translated into different languages. So far, the UNaLab partners have translated the relevant inspiration cards for their challenges into Czech, French, Spanish and Turkish. The cards contain a QR code that links to more information on the UNaLab website.

#### 2.3.1. Nature-based solutions

The first set of inspiration cards present the NBS that are described in the UNaLab Technical Handbook (see UNaLab deliverable D5.1 Interim NBS Technical Handbook). Each card describes the challenges addressed by the NBS, the ecosystem services potentially addressed, and the local conditions necessary for implementation.



Inspiration cards NBS





The visions and specific challenges of the UNaLab follower cities were analysed to identify the need for additional cards. Through literature review and interviews with experts in the field of NBS (e.g., from the networks of the follower cities) the Technical Handbook content was complemented by solutions necessary to meet specific challenges, and anticipated future NBS innovations. This new content will be integrated within the final version of the Technical Handbook.

**2.3.2. Governance actions**

The second set of inspiration cards contains governance actions. Municipal governance recommendations necessary to finance, build, manage and operate NBS were defined in WP6. Together with the UNaLab front-runner cities, governance approaches were developed to support decision-making, management and maintenance of NBS (see also UNaLab deliverable D5.2 Municipal Governance Guidelines). The guidelines were used to create governance action inspiration cards. These cards contain a short description, indicate which governance challenges they address, and provide potential elements that can be included in proposals.



Inspiration cards governance actions

**2.3.3. Value creation**

The third set of inspiration cards provides insight regarding value creation. They are based on the logic of the UNaLab Value Model (see also UNaLab deliverable D6.4 Value Model), which identifies the main beneficiaries and different types of benefits created by NBS.

The cards provide insight into potential benefits and beneficiaries of NBS, and are linked to clusters of similar of NBS.



Inspiration cards value creation

**2.3.4. Financing options**

WP6 also provided insight into the financing instruments that can be used to enable the implementation and maintenance of NBS (see also UNaLab deliverable D6.3 Business Models and Financing Strategies). The set of cards with financing options contain several options from the government, community and market perspectives. Each card contains a short description together with an example.

**2.3.5. Co-creation**

The last set of cards contains the co-creation tools that were developed in WP2 (see also UNaLab deliverable D2.3 UNaLab ULL online tool-kit). The cards not only indicate what the tools can be used for, but also

the information required to facilitate the use and the benefits of using the tools.



Financing options inspiration cards



Co-creation inspiration cards



## 2.4. Templates to support the process in the workshops

In addition to the inspiration cards, a set of templates was developed to support workshops participants in the discussions. These templates guide participants through a structured process that invites discussion of the relevant topics.

### 2.4.1. Roadmap template

The roadmap template contains the complete outline of the roadmap, and provides participants with insight as to how the different elements are linked together. The roadmap template (as shown below) contains a timeline from 'now' through 2050. At the end of the timeline, the desired future scenario is presented to remind the participants of the overall long-term ambition. The interventions are indicated at the beginning of the timeline. These cover the NBS interventions (shown in the dark green area, below) and the governance interventions (shown in the lighter green area, below). Solutions and actions are placed on the timeline and the roadmap is gradually developed during the workshop.

### 2.4.2. Solution cards

Solution cards have been developed to allow the relevant solutions to be captured. There are two types of solution cards: for NBS and for governance actions.



NBS solution cards (dark green) and governance action solution Cards (light green)

The cards are used to indicate the selected solution, but also to enrich the description with relevant information for the specific implementation (e.g., the size of the intervention, the location, important benefits and conditions, or actors to be involved). The cards are placed on the roadmap.

### 2.4.3. Milestones

To complete the timelines for the interventions, intermediate results are also defined using the city-level objectives which are derived from the city's strategic plans.



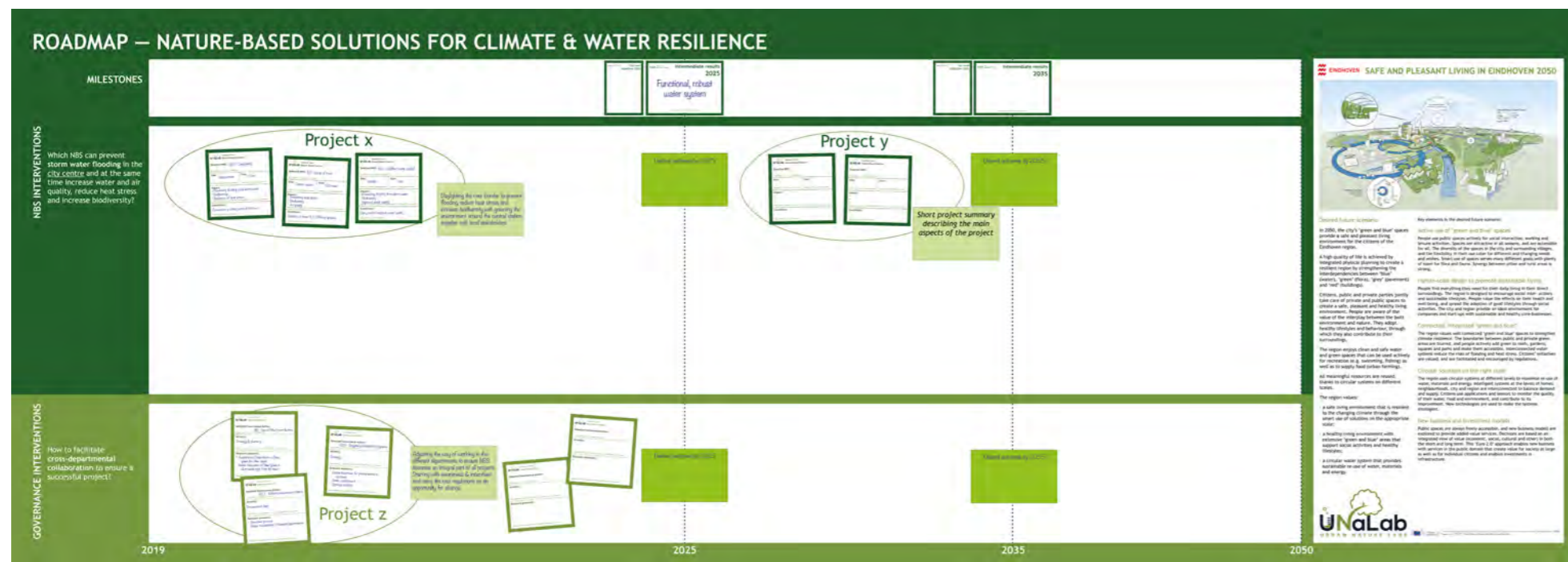
Intermediate results and city-level objectives for 2025 and 2035

### 2.4.4. Project proposals

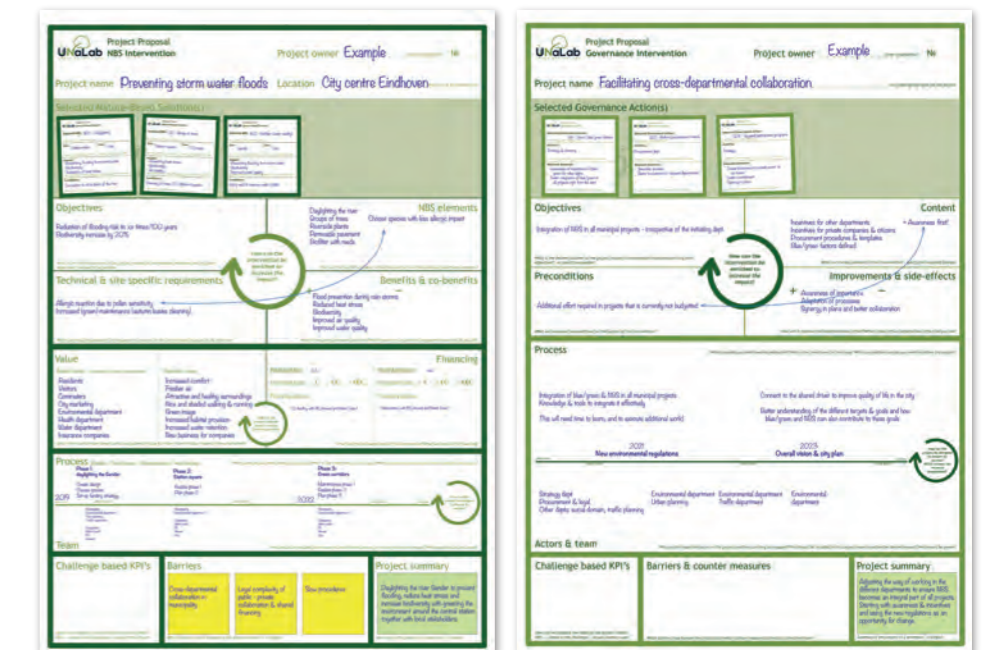
Project proposal templates have been developed to ensure the projects are enriched with the specific perspectives of the individual participants, as well as the relevant information from the inspiration cards.

The NBS intervention project proposal template guides the participants in the discussion to enrich the project in an iterative process that captures the input of various perspectives. The aim is to increase the impact and value of the project for different beneficiaries.

The governance intervention project proposal supports the participants in identifying improvements and pre-conditions, and also provides a process to engage the stakeholders.



Complete roadmap template



NBS intervention project proposal (left) and governance intervention project proposal (right)



## 2.5. A facilitator's manual for the roadmap workshops

### 2.5.1. Introduction

This manual is created to guide facilitators through the UNaLab Roadmapping Workshop. As facilitator your key role is to:

- Guide participants through the process and material provided
- Keep the discussions active and ensure that all participants have equal opportunity to contribute (you may refer to the questions below to do so)
- Keep the discussions focused on NBS
- Keep track of time and make sure the goals of each step are achieved
- Observe the discussions and note down feedback for the provided inputs: the inspiration cards are used as physical “test” how knowledge and content from UNaLab research and activities could be displayed and distributed to interested parties. Therefore, the workshop is an opportunity for us to learn about their effectiveness and the relevance/interest of the content and your observations are crucial to achieve this.
- Make sure all the output is captured in photos at high resolution

### 2.5.2. Preparation

Reservation of a venue with the following requirements:

- Large enough room with flexible tables and chairs – capacity depending on number of expected participants:
  - Four tables to seat working groups (if possible break-out rooms)
  - Large enough flat surface (wall or other) to stick the different parts of the roadmap (at least 3 meter wide flat surface)
  - Four flipchart holders to be used by the groups (to stick A1 poster templates)
  - Optional: projection possibilities for PowerPoint (e.g., to present the desired future scenario and its links to other municipal strategies and plans.

Preparation by the city:

- Selecting of desired participants and send invitations
- Selection of NBS intervention areas and appointment of challenge owners
- Maps, pictures and/or other material of the intervention areas to be used in the workshop
- Prepare a short and clear presentation on the desired future scenario and the links to local plans and strategies (to make sure the participants understand the link of these activities to their day-to-day work and related departmental plans)
- Define city-level objectives (from existing masterplans and strategies) for 2025 and 2035 – relevant for the selected intervention areas

Preparation by the facilitator(s):

- Adaptation of the agenda to fit the regular day structure and working/break times of the city and adding start- and end-times to the agenda (see next page).
- Pre-sort the stack of NBS cards by putting the most relevant ones for the specific NBS interventions on top (and make sure the right sorted stack is on the right table)

### 2.5.3. Agenda of the replication roadmap workshops

Day 1: Identifying and specifying NBS projects for the city with all city stakeholders (internal and external) – in maximum 4 groups (one per NBS intervention area)

Day 2: Defining governance project to enable NBS implementation with the city team, internal stakeholders and key external stakeholders - in maximum 2 groups (one per governance intervention)

DAY 1 – NBS PROJECT PORTFOLIO		
Registration & Coffee		
Morning 3,5 hrs	30 min	Plenary Session I: Welcome & introduction
	1,5 hrs	Group Session I: Selection of NBS & building of strings <i>Coffee (in between morning session)</i>
	30 min	Group Session II cont'd: Intermediate results
	1 hr	Plenary Session II: Presentation & discussion of results
Lunch		
Afternoon 3,5 hrs	30 min	Plenary Session II cont'd: Presentation of city intermediate goals for 2025 and 2035
	2 hrs	Group Session II: Working on NBS project proposals <i>Coffee (in between afternoon session)</i>
	1 hr	Plenary session III: <ul style="list-style-type: none"> <li>• Sharing or results</li> <li>• Collection of barriers for successful implementation</li> <li>• Thank you and feedback</li> </ul>
End day 1		

DAY 2 – GOVERNANCE PROJECTS & ROADMAP		
Registration & Coffee		
Morning 3,5 hrs	1 hr	Plenary Session I: <ul style="list-style-type: none"> <li>• Welcome &amp; introduction</li> <li>• What do we need to enable NBS implementation?</li> </ul>
	1 hrs	Group Session I: Selection of governance actions & building of strings <i>Coffee (in between morning session)</i>
	30 min	Group Session II cont'd: Intermediate results
	1 hr	Plenary Session II: Presentation & discussion of results
Lunch		
Afternoon 3,5 hrs	2 hrs	Group Session II: Working on NBS project proposals <i>Coffeebreak</i>
	1,5 hr	Plenary session III: <ul style="list-style-type: none"> <li>• Sharing of results</li> <li>• Conclusions and discussion on overall roadmap</li> <li>• Thank you and feedback</li> </ul>
	End day 2	



### 2.5.4. Material

#### General material

Make sure there are sufficient materials (at least 4 sets – one for each table):

- Pens and markers
- Post-it Notes in different sizes (square, normal and large size)
- Tape or blue tack to stick posters to the wall

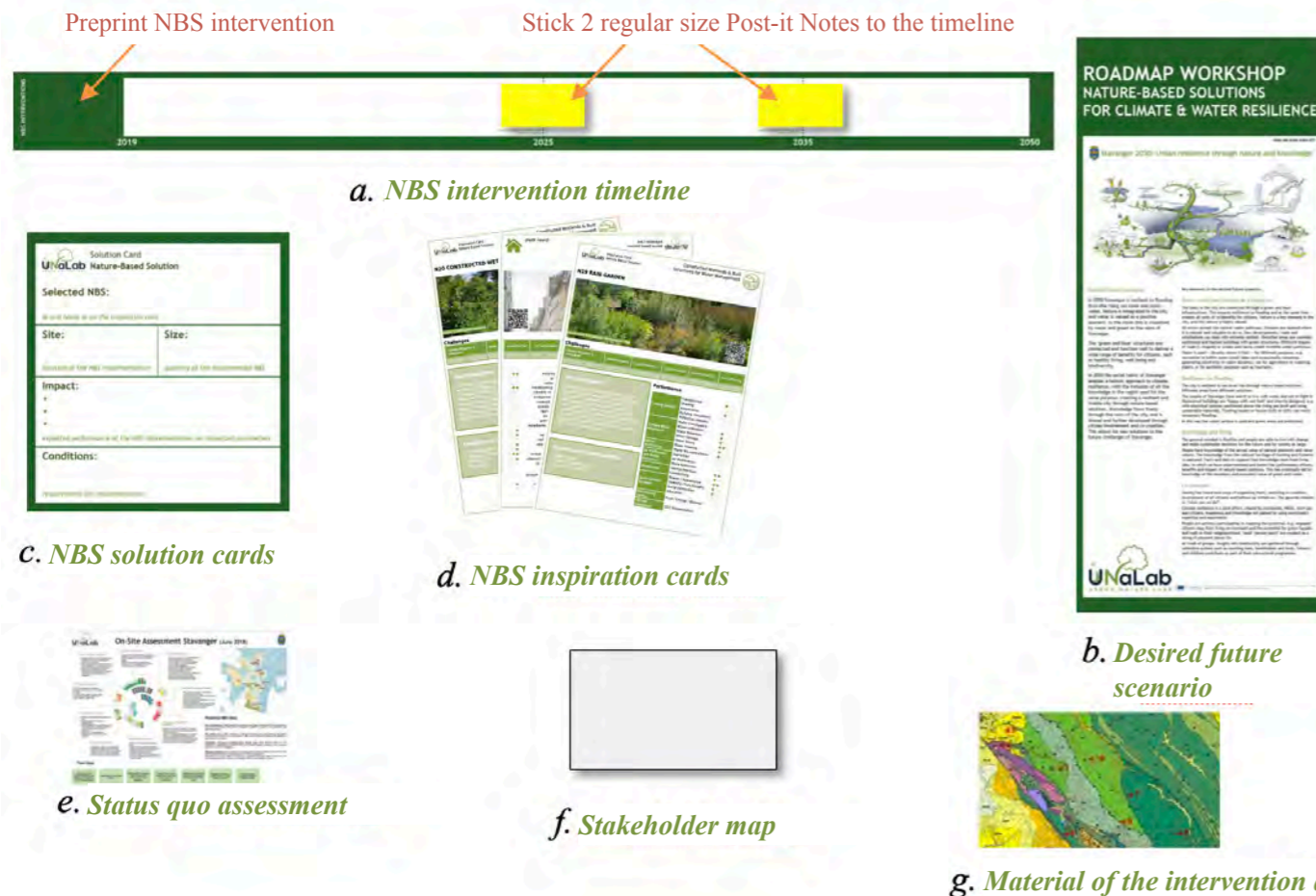
#### Material Day 1 – NBS interventions

Morning sessions:

- Four posters with the **NBS intervention timeline** template, each with two Post-it Notes pasted at 2025 and 2035 (printed on 20cm \* 200cm banner), preferably with the NBS intervention preprinted
- One poster with the **Desired future scenario** (printed on A1 size)
- Eighty **NBS solution cards** (printed on 10\*10cm cards = 6 on A4) = 20 for each timeline
- Four sets of **NBS inspiration cards** (in English or local language if available – printed on A5 cards) = one for each timeline
- One poster with **Status quo assessment** (results from the System Analysis, printed on A0)
- One poster with **Stakeholder map** (results from the System Analysis, printed on A0)
- Maps, pictures and/or other material of the intervention areas (provided by the city)

Afternoon sessions:

- Cards with **City-level objectives** for 2025 and 2035
- Four posters (optional extra as spare) with the **NBS intervention project proposal** template, (printed on A1) each with 4 Post-it Notes pasted at the indicated spots
- Four sets of **Value creation inspiration Cards** (in English or local language if available – printed on A5 cards) = one for each timeline
- Four sets of **Financing option inspiration cards** (in English or local language if available – printed on A5 cards) = one for each timeline





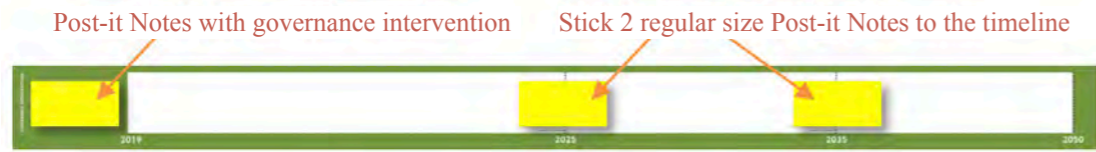
- l. Four sets of **Co-creation inspiration cards** (in English or local language if available – printed on A5 cards) = one for each timeline
- m. One poster for **Barriers & prioritising governance interventions** (printed on A1, prepared with the proposed governance interventions and Post-it Notes for ‘wild cards’)
- n. Four sets of two stickers (with a number 1 and 2) to indicate 1<sup>st</sup> and 2<sup>nd</sup> priority = each one for each timeline-team

**Material Day 2 – Governance interventions**

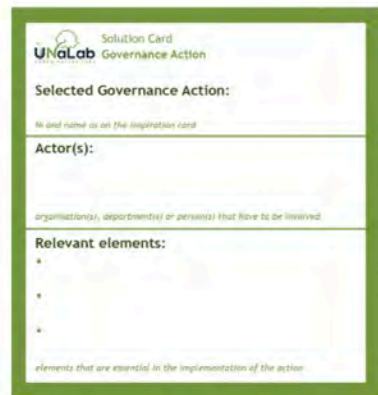
Morning sessions:

The results of the first day are shown on the wall (the Desired future scenario and the four completed NBS intervention timelines with the selected solutions and proposed project results to achieve the desired future). The second day the governance interventions will be added to complete the roadmap. The status quo assessment poster and stakeholder map are also still visible on the wall.

- o. Two **Governance intervention timeline templates**, each with two post-it Notes pasted at 2025 and 2035 (printed on 20cm \* 200cm banner), and one Post-it Notes with the selected governance intervention
- p. Forty **Governance action cards** (printed on 10\*10cm cards = 6 on A4) = 20 for each timeline
- q. Two 2 sets of **Governance inspiration cards** (in English or local language if available – printed on A5 cards) = one for each timeline



**o. Governance intervention timeline**



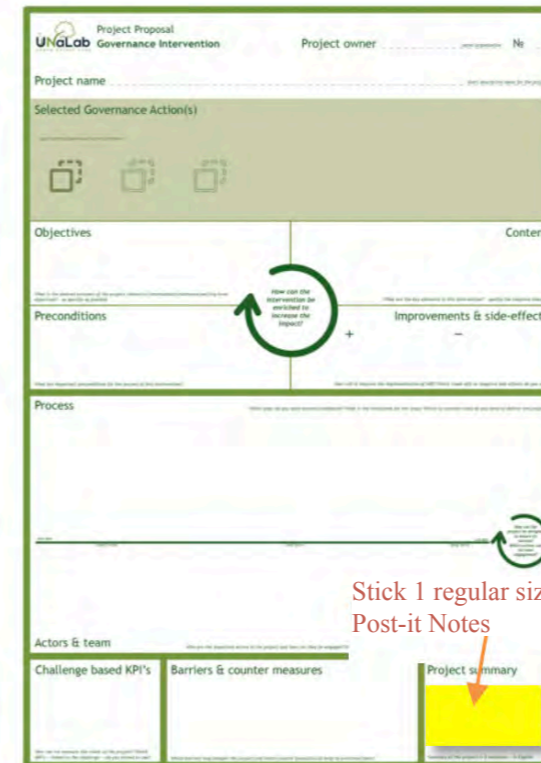
**p. Governance action card**



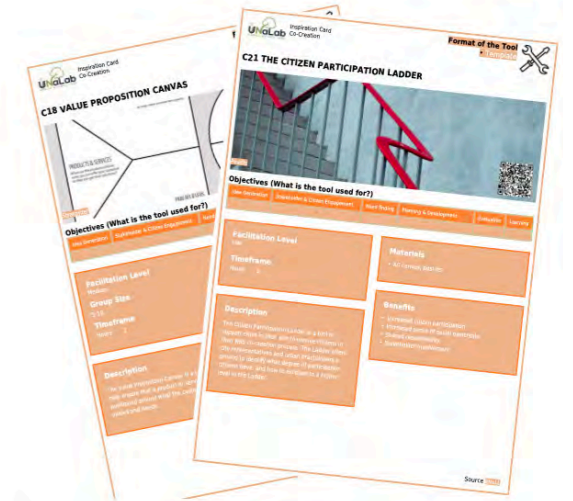
**q. Governance inspiration cards**

Afternoon sessions:

- r. Two posters (optional extra as spare) with the **Governance intervention project proposal** template, (printed on A1) each with one Post-it Notes pasted at the indicated spot
- s. Two sets of **Co-creation inspiration cards** (in English or local language if available – printed on A5 cards) = one for each timeline
- t. One set of **Intermediate result cards** for 2025 and 2035 (printed on A5)



**r. Governance intervention project proposal**



**s. Co-creation inspiration cards**



**t. Intermediate result cards**

### 2.5.5. Facilitating Day 1 – NBS interventions

#### Plenary Session I - Introduction

30 min – Welcome & Introduction by city/facilitator

Preparation:

→ **Poster with desired future scenario** to be put on the wall (ensure sufficient space for the NBS intervention timeline template to be put in front > 2.5 meter required)

→ Put **one empty NBS intervention timeline template** in front.

→ Posters of **Status Quo Assessment** and **Stakeholder Map** to be put on the wall.

City to present:

- Welcome to the participants
- Presentation of the desired future scenario (with the poster on the wall, or PowerPoint), where possible create links to local plans and strategies (to make sure the participants understand the link of these activities to their day-to-day work and related departmental plans)
- NBS intervention areas and their challenge (challenge owners)
- Connection to strategic plans and ambitions

Facilitator to present:

- Overall way of working and use of templates

#### Group Session I – NBS on a timeline

Selection of NBS & Building of Strings – 1,5 h including a coffee break	
Goal	<ul style="list-style-type: none"> <li>• Challenge owners / Facilitators to make sure the intervention area is clear</li> <li>• Participants to create a string of NBS for the chosen intervention area</li> </ul>
Material	<ul style="list-style-type: none"> <li>• One NBS intervention timeline template per table</li> <li>• Small NBS solution cards (to build the strings); the templates are used when one NBS is selected to specify its use in the intervention area.</li> <li>• NBS inspiration cards</li> <li>• Maps/cards/information on the area of the NBS intervention</li> </ul>
Facilitator Task	<ul style="list-style-type: none"> <li>• Introduce the use of inspiration cards and NBS templates to build the strings</li> <li>• <u>Make sure the participants write the number of the selected NBS inspiration cards on the NBS solution cards</u></li> <li>• Animating participants to build a coherent and complete string of NBS</li> <li>• Challenge the participants to make a rich string, spanning the time from “immediate actions” towards 2050</li> <li>• <u>Take the last 15-20 minutes to create a sequence of solutions on the timeline</u></li> <li>• Note down your observations in the feedback sheet</li> </ul>

Questions	<ul style="list-style-type: none"> <li>• From your perspective/looking at the NBS inspiration cards, what NBS could be used to address the challenges at hand?</li> <li>• Does the selected string of solutions sufficiently address the challenges?</li> <li>• Which solutions could you start planning/implementing now? Which solutions could you envision/add in the future?</li> <li>• What does it mean if one NBS is implemented: make the descriptions on the NBS templates as specific and precise as possible</li> </ul>
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Intermediate Results – 30 min	
Goal	• Define the intermediate results for the string for 2025 and 2035
Material	• Post-it Notes are already pasted on the string before hand (2025 and 2035)
Facilitator Task	<ul style="list-style-type: none"> <li>• Animate participants to be as concrete as possible</li> <li>• Challenge participants to be ambitious in their goals</li> <li>• Define one person to present the string to the plenary group</li> </ul>
Questions	<ul style="list-style-type: none"> <li>• Imagine you are in location X in 2025/2035 and look around – what do you see?</li> <li>• Describe all aspects of your results (e.g., air quality / visible green / people in the street)</li> <li>• Can you come up with a concrete estimate/number for this?</li> </ul>

#### Plenary Session II – Presentation timelines & goals

1 hr – Presentation and discussion of results

- Each group will present their string of NBS & intermediate results to the others (the strings are pasted to the wall, where the vision is also already pasted, so the strings lead up to the vision)
- Joint discussion on the strings and identification of interdependencies between the strings
- Groups define concrete projects by drawing circles or marking (e.g., letters or symbols) the proposed NBS that go together. The facilitator makes sure the focus is on NBS solutions (rather than other interventions).

#### Lunch

→ Make photos in high resolution of all the materials so far.

→ Number all the solution cards (on the back) and mark this number at the right location on the string (so that cards can be taken off, and later put back in the same place)

30 min – **Plenary presentation of city intermediate goals for 2025 & 2035**

- The city will briefly present their set targets and milestones (from existing masterplans and strategies) ~ 20 minutes (including questions & answers)
  - pre-filled **City-level objectives** cards for 2025 and 2035 to be put above the roadmap
- Each group should shortly reflect on their strings and intermediate goals in relation to the city goals and



whether these are in line with city-level goals / if they are ambitious enough (gut feeling) ~ 10 minutes

→ adapt/adjust/change the intermediate goals in the strings if required

- The facilitator explains that each group will select one project to be further elaborated on

**Group Session II – NBS project proposals**

Working on NBS project proposals – 2 hours	
Goal	<ul style="list-style-type: none"> <li>• Concrete elaboration and project planning using the project development template</li> <li>• Aim: 1 filled template per group, if the group is very fast a second template can be started</li> </ul>
Material	<ul style="list-style-type: none"> <li>• NBS project proposal template</li> <li>• Different inspiration card sets (NBS, Value Creation, Financing, Co-creation), each to be presented at the related step in the process</li> <li>• City stakeholder map</li> </ul>
Facilitator Task	<ul style="list-style-type: none"> <li>• Guide through the template and make sure it is filled out (important discussion points should all be captured in written form)</li> <li>• Make sure outputs are as specific and concrete as possible</li> <li>• Introduce the right <i>inspiration cards / materials</i> at the right time</li> <li>• Time keeping – make sure the team is going through the iterations quite fast in the beginning, and then use the rest of the time to further enrich the proposal</li> <li>• Translate main summary in English</li> </ul>
<b>NBS intervention project proposal</b> template Step by Step	<p><b>1) What is this project about?</b> ~10 min</p> <ul style="list-style-type: none"> <li>• Groups select the <i>NBS solution cards</i> from their string that are part of the project and stick them to the <i>NBS intervention project proposal</i> template</li> <li>• Note down the concrete location</li> <li>• Responsible Persons and Project Name can be added at the end</li> </ul> <p><b>2) How can the intervention be enriched to increase the impact?</b> ~ 30 min</p> <p>In iterations look at</p> <ul style="list-style-type: none"> <li>• Objectives (what is the desired outcomes of the project and how do these relate to city level goals?)</li> <li>• What is the key NBS element and are there additional elements (NBS/non NBS) which are needed to make the project functioning? -&gt; <i>NBS templates &amp; NBS inspiration cards</i> may be used</li> <li>• Are there synergies between the solutions? Are there any potential trade-offs and disservices that have to be taken care of?</li> <li>• Which technical and site-specific requirements are needed so that the solution can be effective?</li> </ul>

Tips for the facilitator:

- The participants can start by copying the objectives and elements that are described on the NBS inspiration cards. While doing this and going through the circle once, they may come up with additional objectives where NBS reinforce each other
- Stimulate the participants to critically look at the effect of their project in this stage. Also stimulate them to be as specific as possible. E.g., if trees are planted: what type of trees? How can the choices support other benefits?
- Do it iteratively. Go through the entire circle once to collect first ideas and then in a second and third circle add and enrich the descriptions

**3) How can the project value be used to create financing options?** ~ 25 min

- Identify the main beneficiaries of the project and their individual benefits  
→ Use *Value creation inspiration cards* and *Stakeholder map* to enhance discussions. Look at the Value creation index card to find the right Value creation inspiration card for the project at hand
- Roughly estimate the financial cost for realization and maintenance of the project
- Referring to the chosen beneficiaries and the estimated cost, identify suitable financing options for the project  
→ Use *Financing options inspiration cards* to enhance discussions  
→ Inspire people to look beyond the classic financing options where government pays it all; make them think “lower in the pyramid”
- Note down your observations in the feedback sheet

**4) How can the project be designed to ensure its success?** ~ 25 min

- Define the required process steps that are needed for realization write them on the timeline
- What is the expected timeframe for the different steps?
- Are there any co-creation tools that can be used to deliver the project and support the process?  
→ Use *Co-creation inspiration cards* to enhance discussions
- Define a project team and relevant stakeholders to be involved in the different stages
- If not already defined, name a responsible person / stakeholder for the project
- Note down your observations in the feedback sheet

**5) How can the effect be measured and what are important barriers?** ~ 15 min

- Discuss which KPIs could be used to measure the result of the project. What kind of data exists or would be relevant?
- Discuss which barriers exist that may be hampering the implementation of the NBS: try to be as specific as possible (results should be noted on *Post-it Notes* in English – which will be put on the template before hand)

**6) Summarise the project in two (English) sentences.** ~10 min

- The summary should be as short and precise as possible and cover the most important aspects, but still understandable for external people who were not present. It should be noted on the *Post-it Notes* and will later appear in the final roadmap

**7) Add project name and responsible person at the top of the poster** ~ 5 min

**8) Name a person to present the project to the other groups (maximum 5 minutes)**



### Coffee break

- Add a unique project number to the NBS Proposal templates and to the Post-it Notes with the project result
- Make high resolution photos of the NBS Proposal templates

### Plenary Session III – Presentation & identifying barriers

#### 30 min – Sharing of results

- Short presentation of projects by each group (~5 minutes per group + 2 minutes questions)

#### 20 min – Collection of barriers for successful implementation

- Barrier Post-it Notes from the templates to be collected on the *Barriers poster*
- Plenary discussion on the barriers
- Prioritizing the governance interventions to be discussed on day 2: each team gets a ‘number 1’ and ‘number 2’ sticker to prioritise the governance interventions. A ‘wild card’ is provided if a new governance intervention needs to be defined.
  - Post-it Notes can be used to cover governance interventions that are no longer relevant or to add new ones (with a maximum of eight in total before voting).

Material: Post-it Notes with barriers, flipchart to collect barriers, poster with governance areas for voting, stickers to indicate first and second priority (one set per team).

#### 10 min – Thank you and Feedback

- Thank all participants for their contributions & announce drinks/pizza/...
- Give a short outlook on Day 2
- Distribute and fill out individual feedback sheet (~10 min.)

### End day 1

#### Capturing results

- Transfer the NBS Solutions Cards and the Posts-its with project results from the NBS Proposal templates back to the string of solutions
- Make high resolution photo of the complete Roadmap

#### Preparing for Day 2

- Select Governance Interventions to work on during the workshop (maximum 2).
- Write governance intervention on large *Post-it Note* and stick to a *Governance intervention timeline template*.

Participants may choose the intervention to work on themselves, or the facilitators can make groups to ensure a good representation of relevant departments with the selected topics.

### 2.5.6. Facilitating Day 2 - governance interventions

#### Plenary Session I - Introduction

##### 30 min – Welcome and Introduction

Welcome and presentation by facilitator (or city if preferred):

- Aim and session overview will be presented.
- A summary of Day 1 given and the roadmap / NBS projects shown, where possible create links to local plans and strategies (to make sure the participants understand the link of these activities to their day-to-day work and related departmental plans)

Material: *Barrier poster* and *roadmap* from Day 1; *Status Quo Assessment* results.

##### 30 min – What do we need to enable NBS implementation?

- Governance interventions and voting from day 1 will be presented
- Presentation of maximum two governance interventions to be elaborated on and forming of groups

#### Group Session I – Governance actions on a timeline

Selection of governance actions and building a string of action – 1,5 h including a coffee break	
Goal	<ul style="list-style-type: none"> <li>• Challenge owners / Facilitators to make sure the intervention area is clear</li> <li>• Participants to create a string of governance actions for the chosen intervention area</li> </ul>
Material	<ul style="list-style-type: none"> <li>• One <i>Governance intervention timeline</i> template per table</li> <li>• Small <i>Governance action cards</i> (to build the strings); the cards are used when one governance action is selected to specify its use in the governance intervention</li> <li>• <i>Governance inspiration cards</i></li> </ul>
Facilitator Task	<ul style="list-style-type: none"> <li>• Introduce the use of <i>Governance inspiration cards</i> and <i>Governance action cards</i> to build the strings</li> <li>• <u>Make sure the participants write the number of the selected Governance inspiration cards on the Governance action cards</u></li> <li>• Animating participants to build a coherent and complete string of governance actions</li> <li>• Challenge the participants to make a rich string, spanning the time from “immediate actions” towards 2050</li> <li>• Note down your observations in the feedback sheet</li> </ul>
Questions	<ul style="list-style-type: none"> <li>• From your perspective/looking at the Governance inspiration cards, what governance actions could be used to address the challenges at hand?</li> <li>• Does the selected string of actions sufficiently address the challenges?</li> <li>• Which actions could you start planning/implementing now? Which actions could you envision/add in the future?</li> </ul>





Intermediate Results – 30 min	
Goal	<ul style="list-style-type: none"> <li>Define the intermediate results for the string for 2025 and 2035</li> </ul>
Material	<ul style="list-style-type: none"> <li>Post-it Notes are already pasted on the string before hand (2025 and 2035)</li> </ul>
Facilitator Task	<ul style="list-style-type: none"> <li>Animate participants to be as concrete as possible</li> <li>Define one person to present the string to the plenary</li> </ul>
Questions	<ul style="list-style-type: none"> <li>If you look at the string of governance actions – what will they have achieved in 2025 / 2035?</li> <li>Describe all aspects of your results (e.g., number of inhabitants addressed, municipal departments to be involved)</li> <li>Can you come up with a concrete estimate/number for this?</li> </ul>

**Plenary Session II – Presentation & selection of projects**

**1 hour – Presentation and discussion of results**

- Each group will present their string of governance actions and intermediate results to the others
- Joint discussion on the strings and identification of interdependencies between the strings
- Groups define concrete projects by drawing circles or marking (e.g., with letters or symbols) the proposed actions that go together
- Reflection: does the string sufficiently address the challenges at hand?

**Lunch**

- Make photos in high resolution of all the materials so far
- Number all the solution cards (on the back) and mark this number at the right location on the string (so that cards can be taken off, and later put back in the same place)

**Group Session II – Governance project proposals**

Working on NBS project proposals – 2 hours	
Goal	<ul style="list-style-type: none"> <li>Concrete elaboration and project planning using the project development template</li> <li>Aim: one filled template per group, if the group is very fast a second template can be started</li> </ul>
Material	<ul style="list-style-type: none"> <li><b>Governance intervention project proposal</b> template</li> <li>Different <b>inspiration card sets (Governance, Co-creation)</b>, each to be presented at the related step in the process</li> </ul>
Facilitator Task	<ul style="list-style-type: none"> <li>Guide through the template and make sure it is filled out (important discussion points should all be captured in written form)</li> <li>Make sure outputs are as specific and concrete as possible</li> <li>Introduce the right <b>inspiration cards / materials</b> at the right time</li> <li>Time keeping for each step</li> <li>Translate main summary in English</li> </ul>

<p><b>Governance intervention project proposal</b> template Step by Step</p>	<p><b>1) What is this project about?</b></p> <ul style="list-style-type: none"> <li>Look at the <b>Governance action cards</b> that are part of the project</li> <li>Come to a joint understanding what this project is about</li> </ul> <p><b>2) How can the intervention be enriched to increase the impact?</b></p> <p>In iterations look at</p> <ul style="list-style-type: none"> <li>Objectives - what is the desired outcomes of the project and how do these relate to city level goals?</li> <li>What is the key elements and are there additional elements which are needed to make the project functioning? → <b>Governance action cards &amp; Governance inspiration cards</b> may be used</li> <li>How will these actions improve NBS uptake? Are there any potential synergies or trade-offs?</li> <li>What are important preconditions so that the project can be effective?</li> </ul> <p><u>Tips for the facilitator:</u></p> <ul style="list-style-type: none"> <li>The participants can start by copying the outcomes and elements that are described on the Governance action cards. While doing this and going through the circle once, they may come up with additional outcomes where governance actions reinforce each other.</li> <li>Stimulate the participants to critically look at the effect of their project in this stage.</li> <li>Do it iteratively. Go through the entire circle once to collect first ideas and then in a second and third circle add and enrich the description</li> </ul> <p><b>3) How does the process look like &amp; who are important actors?</b></p> <ul style="list-style-type: none"> <li>Define the required process steps that are needed for realization write them on the timeline</li> <li>What is the expected timeframe for the project and the different steps?</li> <li>Who are the main actors in this project → You may refer to the <b>Stakeholder map</b> to enhance discussions</li> <li>How can the actors be engaged and what would motivate them to join the project?</li> <li>Who should be included in the project team and how should responsibilities be allocated? (If not already defined, name a responsible person / stakeholder for the project)</li> <li>Are there any co-creation tools that can be used to deliver the project and support the process?               <ul style="list-style-type: none"> <li>→ Use <b>Co-creation inspiration cards</b> to enhance discussions</li> <li>→ Note your observations in the feedback form</li> </ul> </li> </ul> <p><u>Tips for the facilitator:</u></p> <ul style="list-style-type: none"> <li>Here also: do it iteratively. Go through the entire circle once to collect first ideas and then in a second and third circle add and enrich the descriptions</li> </ul> <p><b>4) How can the effect be measured and what are important barriers?</b></p> <ul style="list-style-type: none"> <li>Discuss which KPIs could be used to measure the result of the project. What kind of data exists or would be relevant?</li> </ul>
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**5) Summarise the project in two (English) sentences**

- The summary should be as short and precise as possible and cover the most important aspects. It should be noted on the *Post-it Note* and will later appear in the final roadmap

**6) Define a project name and if already possible a responsible person****Coffee Break**

→ Add a unique project number to the Governance project proposal templates and to the Post-it Notes with the project result

→ Make high resolution photos of the Governance project proposal templates

***Plenary Session III – Presentation & reflection on complete roadmap*****30 min – Sharing of results**

- Short presentation of projects by each group (~15 min.)
  - Transfer of the Post-it Notes from the project proposal templates to the timelines of the roadmap

**50 min – Conclusions and plenary discussions on overall roadmap**

- Summarise outcomes and intermediate results from Days 1 and 2
- Potential presentation to politicians
- In plenary session capture the key elements for the overall intermediate goals in the roadmap on the *Intermediate results cards for 2025 and 2035* (if time allows sentences can be created – otherwise keywords will do and we can complete the milestone descriptions later on with the city team).

**10 min – Thank you and Feedback**

- Thank all participants for their contributions & announce drinks/pizza/...
- Distribute and fill out individual feedback sheet (~10 min.)

**End day 2*****Capturing results***

→ Transfer the Governance action cards and the Posts-its with project results from the Governance project proposal templates back to the string of solutions

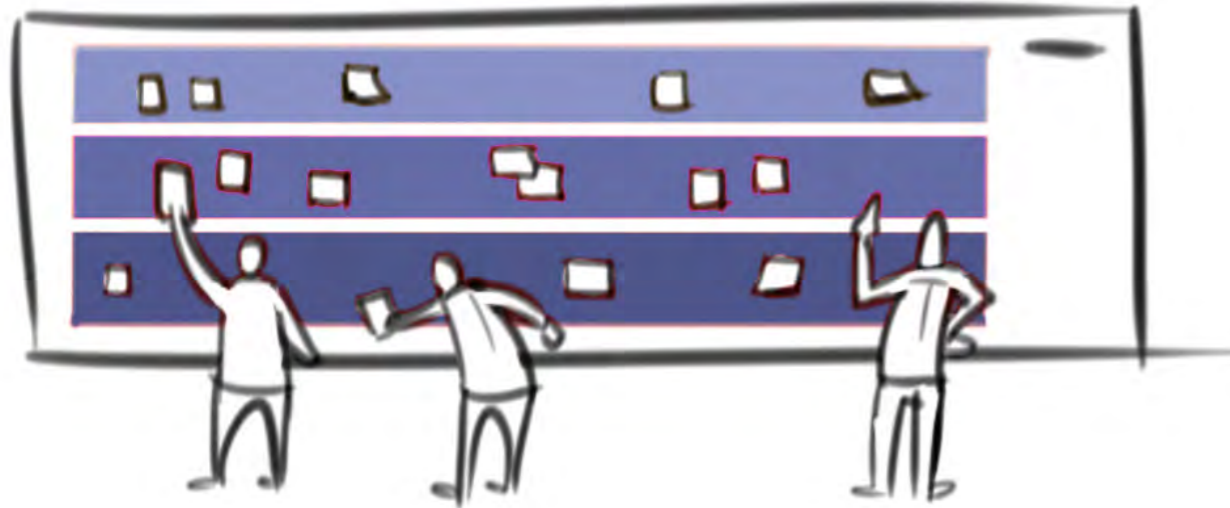
→ Make sure all elements of the complete Roadmap are visible and readable (no overlap in cards and Post-it Notes)

→ Make high resolution photo of the complete Roadmap (if necessary in more parts)









## Section III — Roadmapping





### 3. CO-CREATING THE ROADMAPS FOR FOLLOWER CITIES

The city roadmaps for NBS towards climate and water resilience in 2050 were developed in two-day roadmap workshops applying the Replication Framework with all relevant stakeholders in the respective UNaLab follower cities. The results of the vision development and system analysis in the cities were used to identify specific project opportunities for the short, mid and long term. In this way the derived city-specific roadmaps bridge the gap between the starting position of each follower city (identified in the system analysis) and the desired future scenario (created in the vision development).

#### 3.1. Approach Roadmap Workshops

The aim of the Roadmap Workshops was to develop city roadmaps for NBS towards climate and water resilience, as well as a coherent project portfolio. The Replication Framework was used to support the participants. We addressed specific challenges in each city to define relevant projects for that city. Based on the desired future scenario for 2050 and the results of the system analysis, NBS interventions and governance interventions were defined as a starting points for the workshops. The workshop participants identified projects to address these intervention challenges and placed them on a timeline, together with a set of clear milestones towards the respective desired future scenario.

##### 3.1.1. Day 1: NBS project portfolio

During the first day of the workshop a maximum of four NBS interventions were divided into working groups (each group had around eight members – consisting of internal and external stakeholders – per intervention area). In the morning session these groups identified relevant NBS interventions (selecting the NBS inspiration cards or adding their own ideas for NBS solutions). The selected NBS were used to build coherent strings of solutions on a timeline. Intermediate results contributing to the overall goals were identified, based on the city-level objectives for 2025 and 2035 (derived from local plans and strategies). In the afternoon session the groups chose a relevant project to create a more detailed project proposal. In this proposal they explored the stakeholders, identified the value of the solutions for different stakeholders and define potential financing options. Several iterations and the Value creation inspiration cards, Financing option inspiration cards and the Co-creation inspiration cards were used to enrich the project proposal. At the end of the day the identified barriers for successful implementation were collected and compared with the identified governance interventions. A decision was then made which governance interventions (a maximum of two) would be worked on during the second day.

##### 3.1.2. Day 2: governance projects and roadmap

During the second day of the workshop the two governance interventions were divided in the working groups (each group of around 8 members – consisting of internal stakeholders of the relevant departments of the municipality – per intervention area). In the morning these groups identified relevant governance actions (by selecting the Governance action inspiration cards, or adding their own ideas for governance actions). A coherent string of actions was created on a timeline. For 2025 and 2035 intermediate results were identified that contribute to the overall goals of the city. In the afternoon session the groups chose a relevant project to create a more detailed project proposal. Here they explored the objective and preconditions, and also proposed a process and actors to be involved in the project. Several iterations and the Co-creation inspiration cards were used to enrich the proposal. At the end of the day the complete roadmap was presented on the wall, and a reflection was done on the overall intermediate results that can be expected from the proposals for both NBS and governance projects.

Day 1	Day 2
<b>NBS project portfolio</b> <ul style="list-style-type: none"> <li>• Selection of NBS and building of timelines for the NBS intervention areas</li> <li>• Intermediate results for 2025 and 2035 based on city-level objectives</li> <li>• Development of project proposals for NBS interventions</li> <li>• Collection of barriers for successful implementation</li> </ul>	<b>Governance projects and roadmap</b> <ul style="list-style-type: none"> <li>• Selection of actions and creation of timelines for the governance interventions</li> <li>• Intermediate results for 2025 and 2035</li> <li>• Development of project proposals for Governance interventions</li> <li>• Creation of overall roadmap and definition of overall intermediate results</li> </ul>

*Programme of the Roadmap Workshops in the cities*

The outcome of the roadmap workshops in the UNaLab follower cities was a series of comprehensive roadmaps for NBS replication (one per follower city) tailored to the specific context of each city and containing a set of projects to be implemented in that city. In accordance with the UNaLab Grant Agreement 730052, the full project proposals are not included in this (public) report.

## 4. ROADMAP - NBS FOR CLIMATE & WATER RESILIENCE

### 4.1. How to read the roadmaps

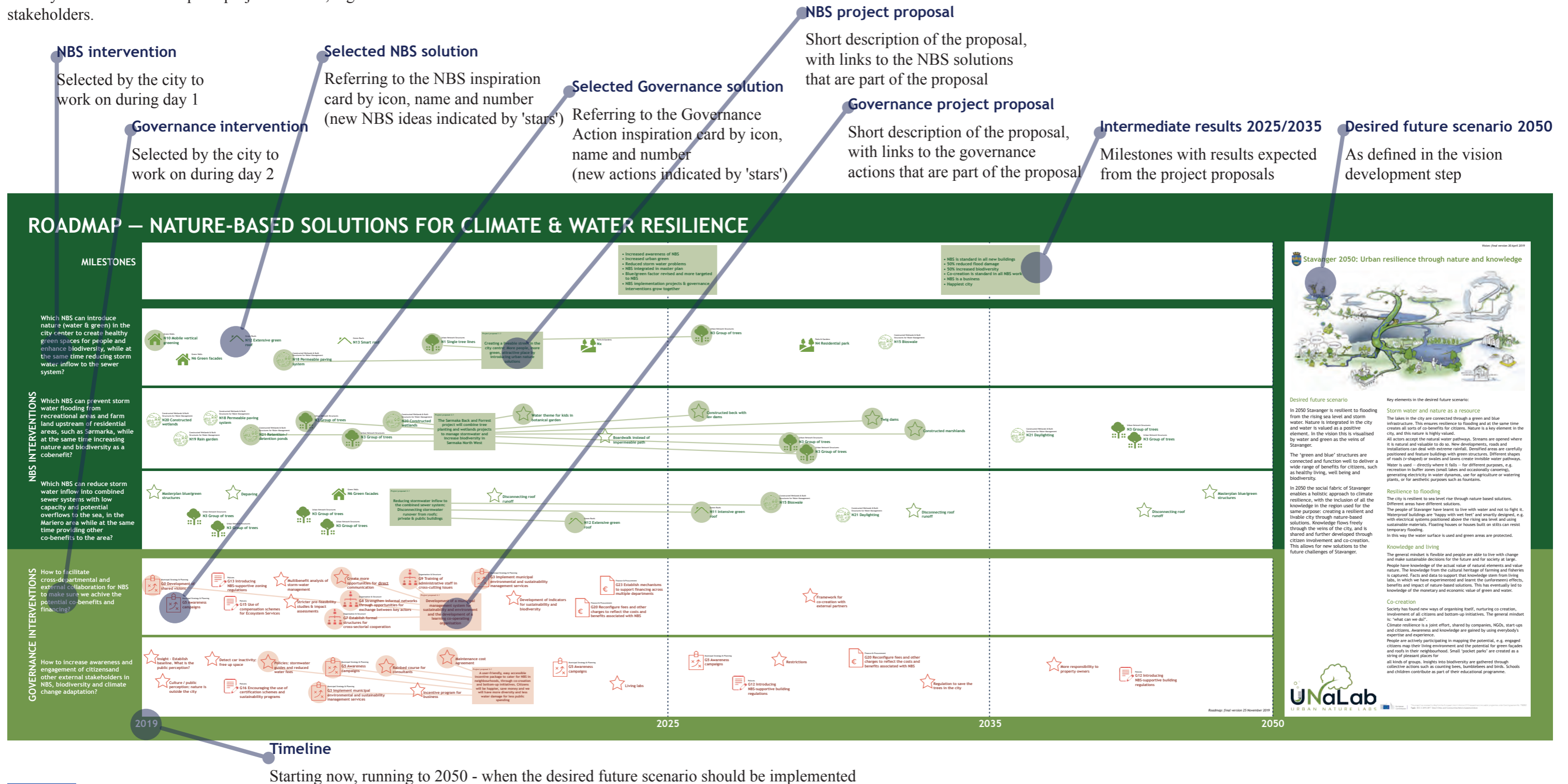
This chapter presents the resulting city roadmaps. For confidentiality reasons these roadmaps contain a summary of the complete roadmaps and project proposals that were created in the workshops.

The detailed roadmaps and accompanying project proposals will be used by the cities to develop the projects further, together with the local stakeholders.

Each city roadmap is presented in the same format, to allow easy comparisons and identification of commonalities in the selected solutions.

The image below explains how to read the roadmap.

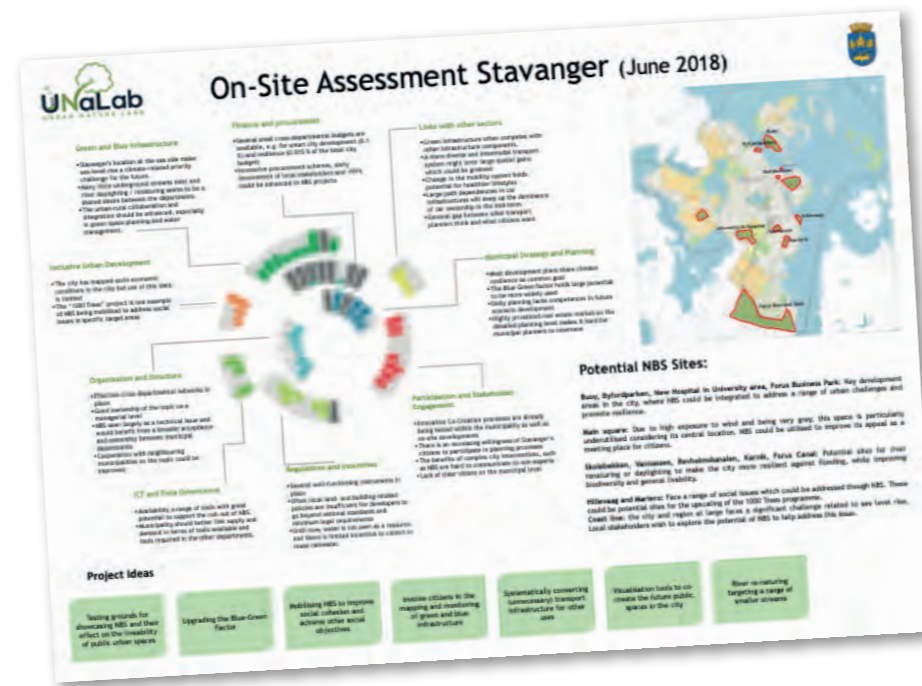
*Note: the descriptions of the interventions and selected solutions are copied exactly from the workshop results to ensure maximum recognition for the participants. We apologise for occasional grammar mistakes or deviations in use of terminology.*



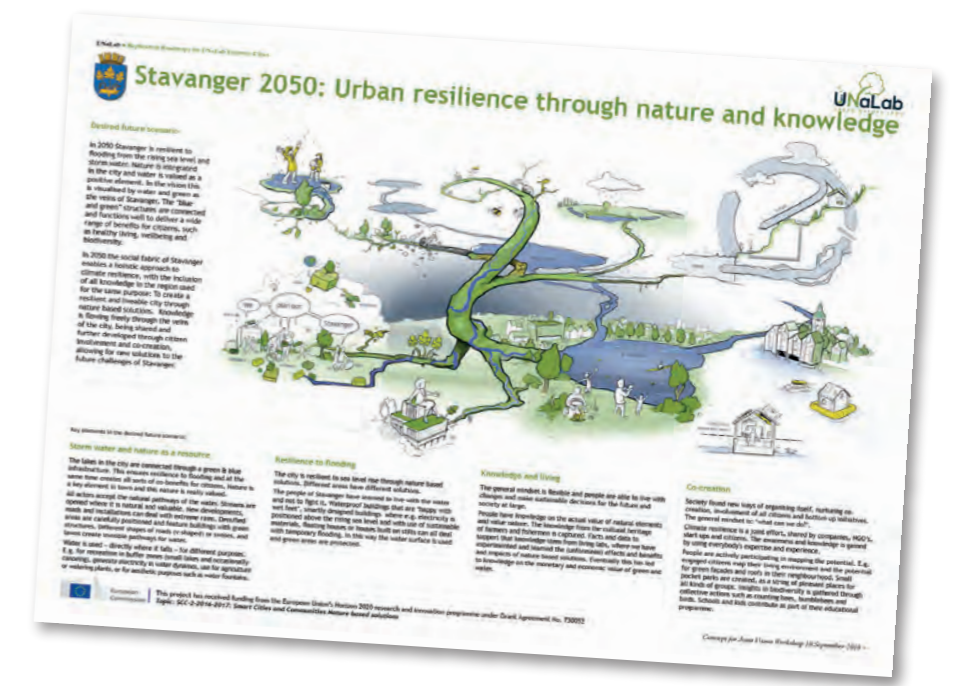








Results of the systems analysis in Stavanger



The desired future scenario for Stavanger

## 4.2. Roadmap Stavanger

The roadmap workshop in Stavanger was held on 21 and 22 August 2019. The starting point was the ambition of Stavanger to achieve urban resilience through nature and knowledge by 2050.

Stavanger selected three **NBS interventions** for the discussion during the first day of the roadmap workshop:

Which NBS can introduce nature (water & green) in the city centre to create healthy green spaces for people and enhance biodiversity, while at the same time reducing storm water inflow to the sewer system?

Which NBS can prevent storm water flooding from recreational areas and farm land upstream of residential areas, such as Sørmarka, while at the same time increasing nature and biodiversity as a co-benefit?

Which NBS can reduce storm water inflow into combined sewer systems with low capacity and potential overflows to the sea, in the Mariero area while at the same time providing other co-benefits to the area?

Based on the results of the system analysis and the analysis of the barriers identified by the groups working on the NBS interventions during the first day of the workshop, two **Governance interventions** were defined for the discussions during the second day of the workshop:

How to facilitate cross-departmental and external collaboration for NBS to make sure we achieve the potential co-benefits and financing?

How to increase awareness and engagement of citizens and other external stakeholders in NBS, biodiversity and climate change adaptation?

The summary of the resulting roadmap of the workshops is presented on the next page.

# ROADMAP – NATURE-BASED SOLUTIONS FOR CLIMATE & WATER RESILIENCE

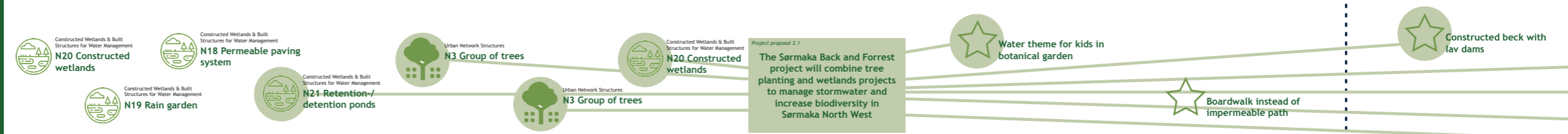
## MILESTONES

- Increased awareness of NBS
- Increased urban green
- Reduced storm water problems
- NBS integrated in master plan
- Blue/green factor revised and more targeted to NBS
- NBS implementation projects & governance interventions grow together

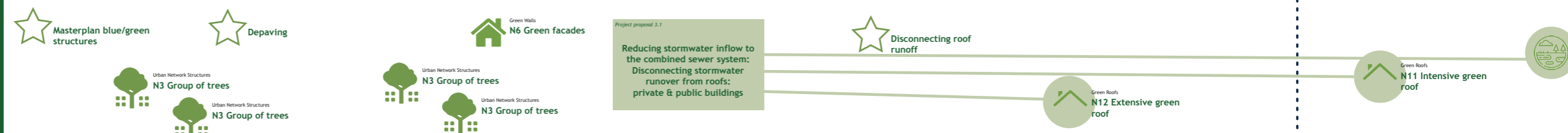
Which NBS can introduce nature (water & green) in the city center to create healthy green spaces for people and enhance biodiversity, while at the same time reducing storm water inflow to the sewer system?



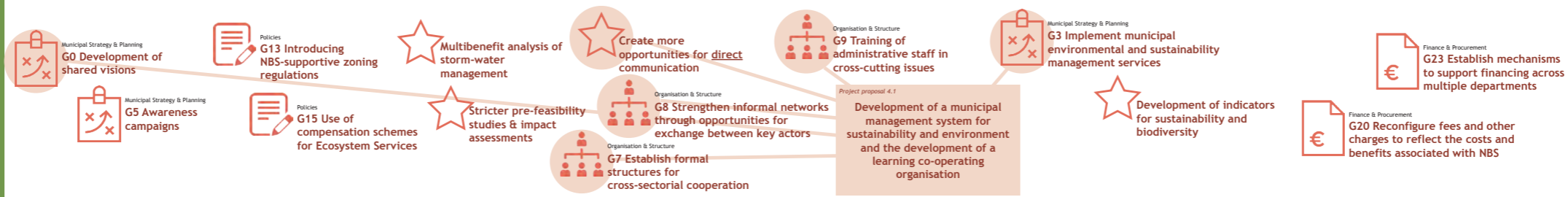
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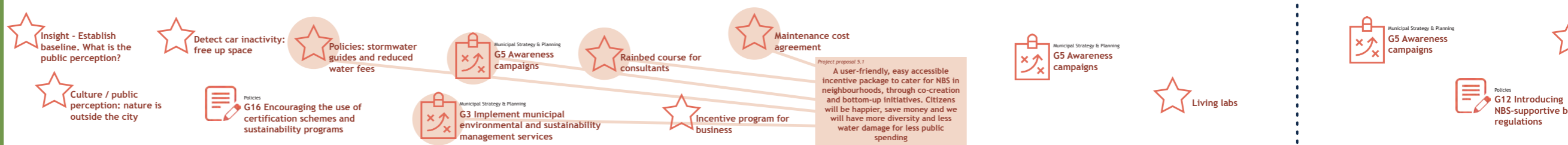
Which NBS can reduce storm water inflow into combined sewer systems with low capacity and potential overflows to the sea, in the Mariero area while at the same time providing other co-benefits to the area?



How to facilitate cross-departmental and external collaboration for NBS to make sure we achieve the potential co-benefits and financing?



How to increase awareness and engagement of citizens and other external stakeholders in NBS, biodiversity and climate change adaptation?



2019

2025



- NBS is standard in all new buildings
- 50% reduced flood damage
- 50% increased biodiversity
- Co-creation is standard in all NBS work
- NBS is a business
- Happiest city

Parks & Gardens  
N4 Residential park

Constructed Wetlands & Built Structures for Water Management  
N15 Bioswale

Twig dams

Constructed marshlands

Urban Network Structures  
N3 Group of trees

Urban Network Structures  
N3 Group of trees

Constructed Wetlands & Built Structures for Water Management  
N21 Daylighting

Urban Network Structures  
N3 Group of trees

Urban Network Structures  
N3 Group of trees

Constructed Wetlands & Built Structures for Water Management  
N15 Bioswale

Constructed Wetlands & Built Structures for Water Management  
N21 Daylighting

Disconnecting roof runoff

Disconnecting roof runoff

Masterplan blue/green structures

Framework for co-creation with external partners

Restrictions

Finance & Procurement  
G20 Reconfigure fees and other charges to reflect the costs and benefits associated with NBS

Regulation to save the trees in the city

More responsibility to property owners

Policies  
G12 Introducing NBS-supportive building regulations

Roadmap: final version 25 November 2019

2035

2050

Vision: final version 30 April 2019

## Stavanger 2050: Urban resilience through nature and knowledge



### Desired future scenario

In 2050 Stavanger is resilient to flooding from the rising sea level and storm water. Nature is integrated in the city and water is valued as a positive element. In the vision this is visualised by water and green as the veins of Stavanger.

The 'green and blue' structures are connected and function well to deliver a wide range of benefits for citizens, such as healthy living, well being and biodiversity.

In 2050 the social fabric of Stavanger enables a holistic approach to climate resilience, with the inclusion of all the knowledge in the region used for the same purpose: creating a resilient and livable city through nature-based solutions. Knowledge flows freely through the veins of the city, and is shared and further developed through citizen involvement and co-creation. This allows for new solutions to the future challenges of Stavanger.

### Key elements in the desired future scenario:

#### Storm water and nature as a resource

The lakes in the city are connected through a green and blue infrastructure. This ensures resilience to flooding and at the same time creates all sorts of co-benefits for citizens. Nature is a key element in the city, and this nature is highly valued.

All actors accept the natural water pathways. Streams are opened where it is natural and valuable to do so. New developments, roads and installations can deal with extreme rainfall. Densified areas are carefully positioned and feature buildings with green structures. Different shapes of roads (v-shaped) or swales and lawns create invisible water pathways. Water is used – directly where it falls – for different purposes, e.g. recreation in buffer zones (small lakes and occasionally canoeing), generating electricity in water dynamos, use for agriculture or watering plants, or for aesthetic purposes such as fountains.

#### Resilience to flooding

The city is resilient to sea level rise through nature based solutions. Different areas have different solutions.

The people of Stavanger have learnt to live with water and not to fight it. Waterproof buildings are 'happy with wet feet' and smartly designed, e.g. with electrical systems positioned above the rising sea level and using sustainable materials. Floating houses or houses built on stilts can resist temporary flooding.

In this way the water surface is used and green areas are protected.

#### Knowledge and living

The general mindset is flexible and people are able to live with change and make sustainable decisions for the future and for society at large.

People have knowledge of the actual value of natural elements and value nature. The knowledge from the cultural heritage of farming and fisheries is captured. Facts and data to support that knowledge stem from living labs, in which we have experimented and learnt the (unforeseen) effects, benefits and impact of nature-based solutions. This has eventually led to knowledge of the monetary and economic value of green and water.

#### Co-creation

Society has found new ways of organising itself, nurturing co creation, involvement of all citizens and bottom-up initiatives. The general mindset is: 'what can we do?'

Climate resilience is a joint effort, shared by companies, NGOs, start-ups and citizens. Awareness and knowledge are gained by using everybody's expertise and experience.

People are actively participating in mapping the potential, e.g. engaged citizens map their living environment and the potential for green façades and roofs in their neighbourhood. Small 'pocket parks' are created as a string of pleasant places for

all kinds of groups. Insights into biodiversity are gathered through collective actions such as counting bees, bumblebees and birds. Schools and children contribute as part of their educational programme.

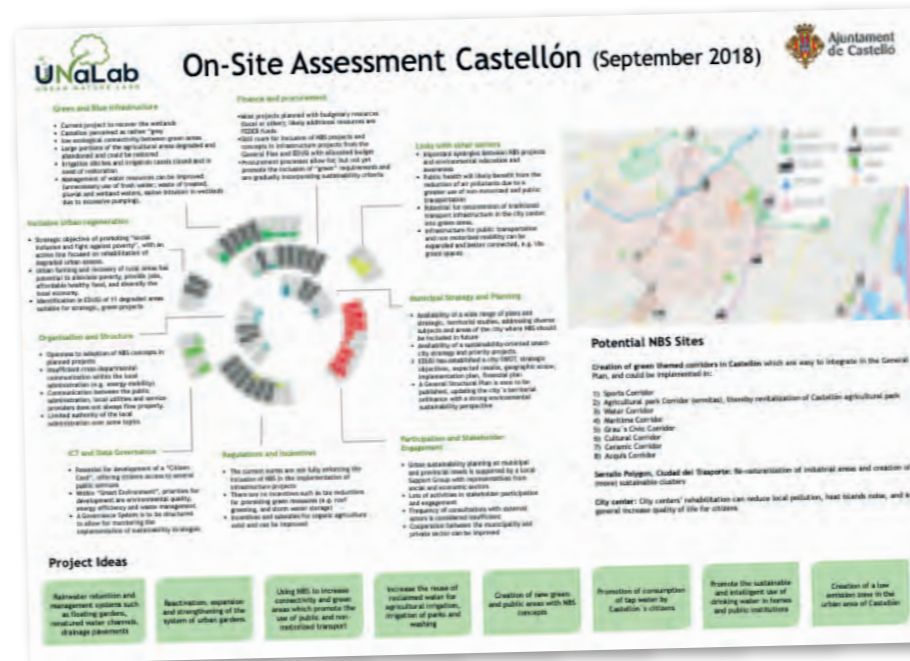
**UNaLab**  
URBAN NATURE LABS

European Commission  
This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052  
Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions









Results of the systems analysis in Castellón



The desired future scenario for Castellón

### 4.3. Roadmap Castellón

The roadmap workshop in Castellón was held on 25 and 26 September 2019. The starting point was the ambition of Castellón to achieve a green city for all people to live by 2050.

Castellón selected four **NBS interventions** for the discussion during the first day of the roadmap workshop:

Which NBS will enable water retention, during heavy rainfall and circular water systems for purified waste water, in the wetlands and the river and make the place attractive for recreation and useful for agriculture?

Which NBS can improve air quality and reduce heat stress, so people enjoy walking and cycling through the city (Ermitas, Puente rio seco, city center, avd. del Mar, Paseo Morella, Parque Ribalta)?

Which NBS will improve social cohesion and local food production in the Green agricultural ring around the city centre?

Which NBS will enable circular systems for water and waste and create comfortable space for active and vital employees in the industrial areas of Serrallo Polygon and Ciudad del Transporte?

Based on the results of the system analysis and the analysis of the barriers identified by the groups working on the NBS interventions during the first day of the workshop, two **Governance interventions** were defined for the discussions during the second day of the workshop:

How to facilitate cross-departmental collaboration and smoothen administrative processes for NBS?

How to facilitate sustainable public-private partnerships and cooperation for NBS?

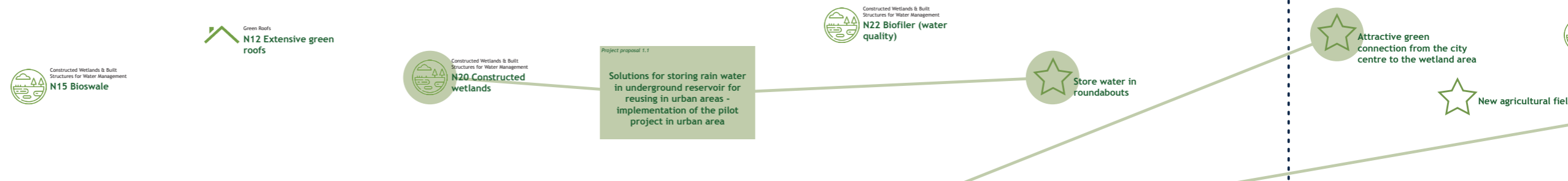
The summary of the resulting roadmap of the workshops is presented on the next page.

# ROADMAP – NATURE-BASED SOLUTIONS FOR CLIMATE & WATER RESILIENCE

## MILESTONES

- Increase green areas to 15m<sup>2</sup>/ha
- Increase biotope area factor in 10%
- Implement bike lanes (km) according to the master plan
- Technical study on the water quality in the wetlands
- Directory plan with other municipalities ready
- Transversal interadministrative strategy ready

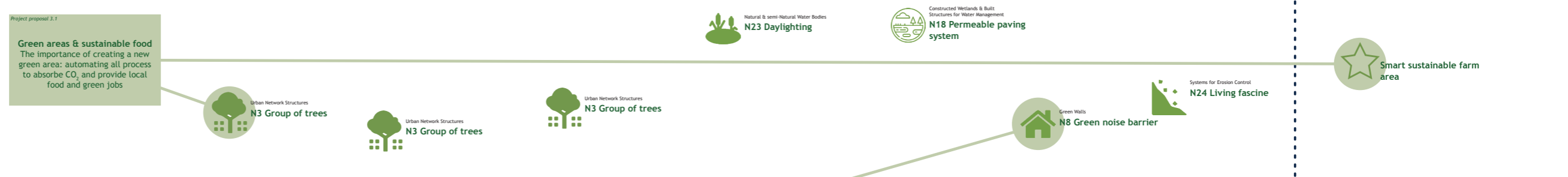
Which NBS will enable water retention, during heavy rainfall and circular water systems for purified waste water, in the wetlands and the river and make the place attractive for recreation and useful for agriculture?



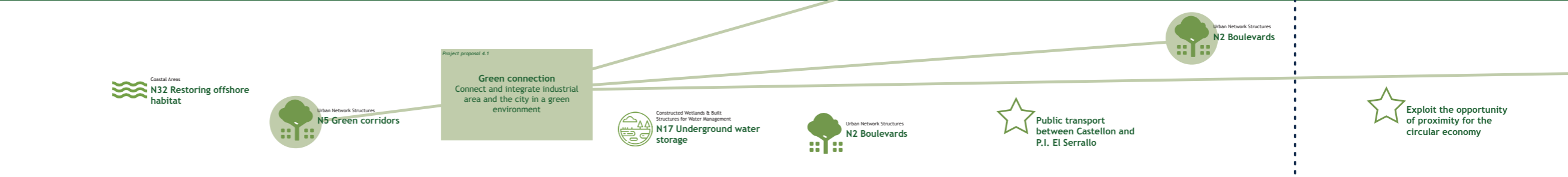
Which NBS can improve air quality and reduce heat stress, so people enjoy walking and cycling through the city (Ermitas, Puente rio seco, city center, avd. del Mar, Paseo Morella, Parque Ribalta)?



Which NBS will improve social cohesion and local food production in the Green agricultural ring around the city centre?

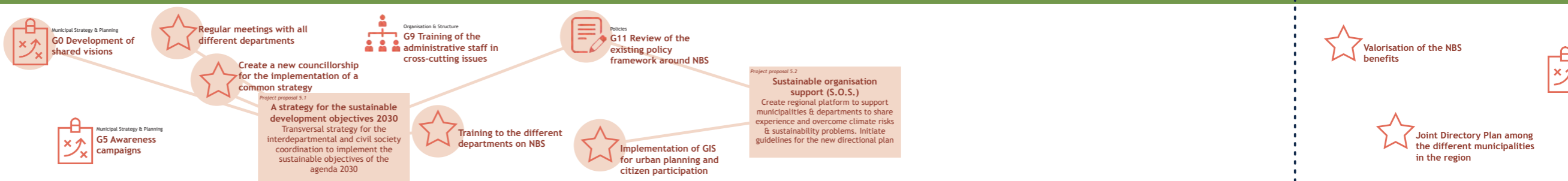


Which NBS will enable circular systems for water and waste and create comfortable space for active and vital employees in the industrial areas of Serrallo Polygon and Ciudad del Transporte?



## GOVERNANCE INTERVENTIONS

How to facilitate cross-departmental collaboration and smoothen administrative processes for NBS?

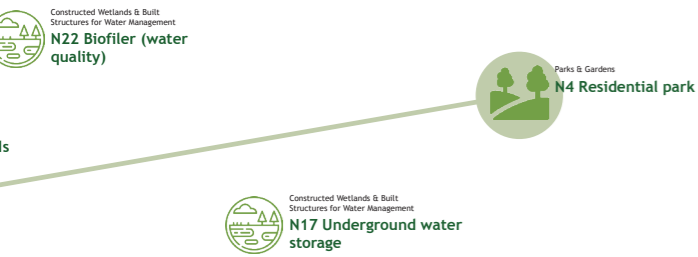


2019

2025



- Surface of organic agriculture in the urban area
- Biofilter implemented in wetlands
- Biotop area factor increase in 30%
- Increase green areas to 20m<sup>2</sup>/ha
- Additional bike lines implemented than the ones on the master plan
- Super blocks from master plan implemented



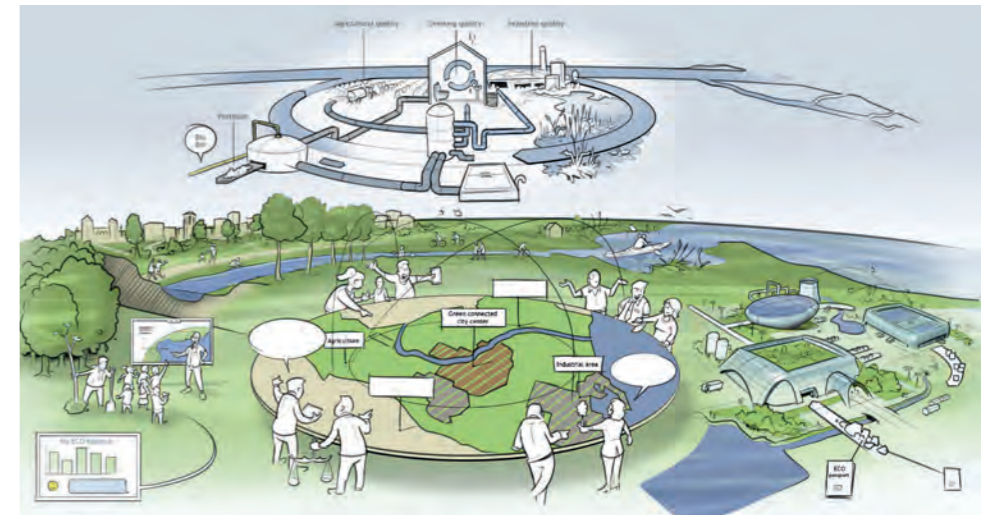
2035

Roadmap: final version 5 February 2020

2050

Vision: final version 30 April 2019

## Castellón 2050: A green city for all people to live



### Desired future scenario

In 2050 Castellón is making the best possible use of water and natural resources. Zero waste is achieved through 100% re-use of waste water with actions on different scales at home, district and city levels, taking into account the different quality levels of water. The people of Castellón enjoy their green city, well connected to the sea. Green corridors that connect the different areas of the city provide a high quality living environment for everyone. A zone around the city with nature-based solutions creates a pleasant surrounding, with local agriculture, developed wetlands and 'green' industrial areas.

In 2050 the people of Castellón act responsibly with regard to water, waste and natural resources. Applying nature-based solutions is standard procedure in the municipality's policy-making and city design. Everybody is involved in the planning and design of their living environments, and has the knowledge to recognise the impact on the quality of their life.

### Key elements in the desired future scenario:

#### Zero-waste water cycle

A holistic strategy for water management in the region realises a zero-waste water cycle. The river, filled with rainwater and purified waste water, is the centrepiece. Systems for water storage (e.g. during heavy rainfall), treatment and re-use at different levels (e.g. home, district, city) are applied, and the water quality is monitored to stimulate circularity for different applications. The wetlands are a lake district, where recreation, water retention and agriculture go hand in hand.

#### Green connections through the city

The people of Castellón enjoy their green city with a comfortable living environment for everyone. The green contributes to a high air quality and a pleasant climate.

People spend a lot of time outdoors in shaded streets and squares. They enjoy walking or cycling towards the sea on paths through attractive wetlands or along local agricultural sites, where people can pick their own food. The riverbanks provide spaces for children to play and green paths for pedestrians and cyclists. The river has become a lively area of the city.

#### Education in sustainability ... the starting point

The awareness and knowledge of the people of Castellón is high, as a result of a strong educational programme that involves children, adults, administration, companies and professionals. People adopt sustainable behaviour, supported by new technologies that gather data and increase knowledge on the impact of nature-based solutions on climate and water resilience. A local board of sustainability is a mix of politicians, experts, people from companies and citizens from different neighbourhoods, who together develop the knowledge of what is possible in the areas of water, energy and resources.

#### 'Green' industrial areas

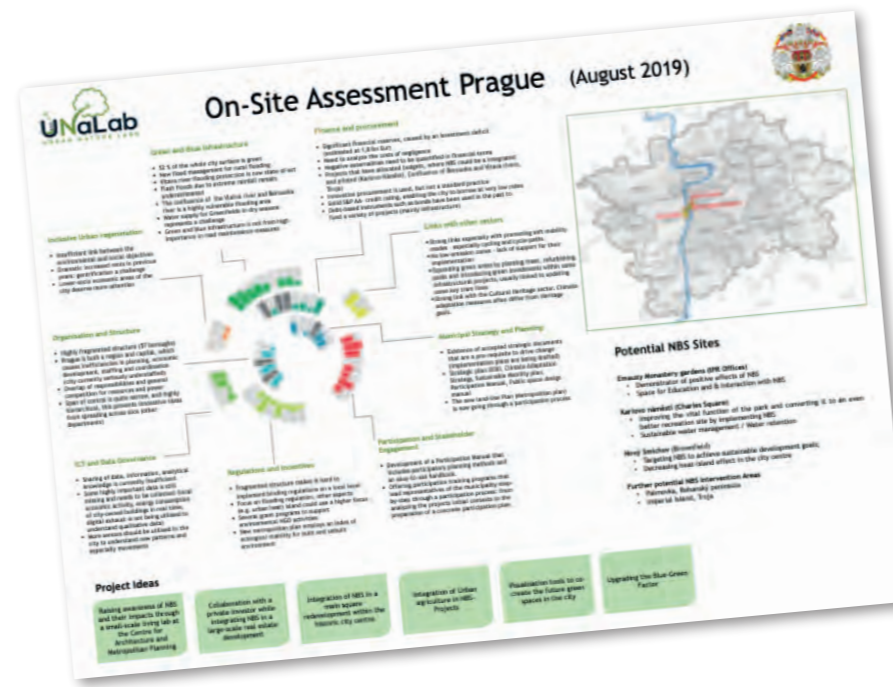
Industrial areas are small 'eco-cities', where companies together create circular solutions for water, waste and renewable energy. A reliable water system monitors the different quality levels and stimulates re-use for the right purposes. An eco-passport for waste enables the re-use of materials. Renewable energy solutions, such as thermal energy, solar, wind and biomass, are jointly implemented. Industrial areas are green areas, with shaded bicycle paths for commuting and running tracks for lunchtime activities. Green roofs and façades provide a comfortable space for happy and vital employees.



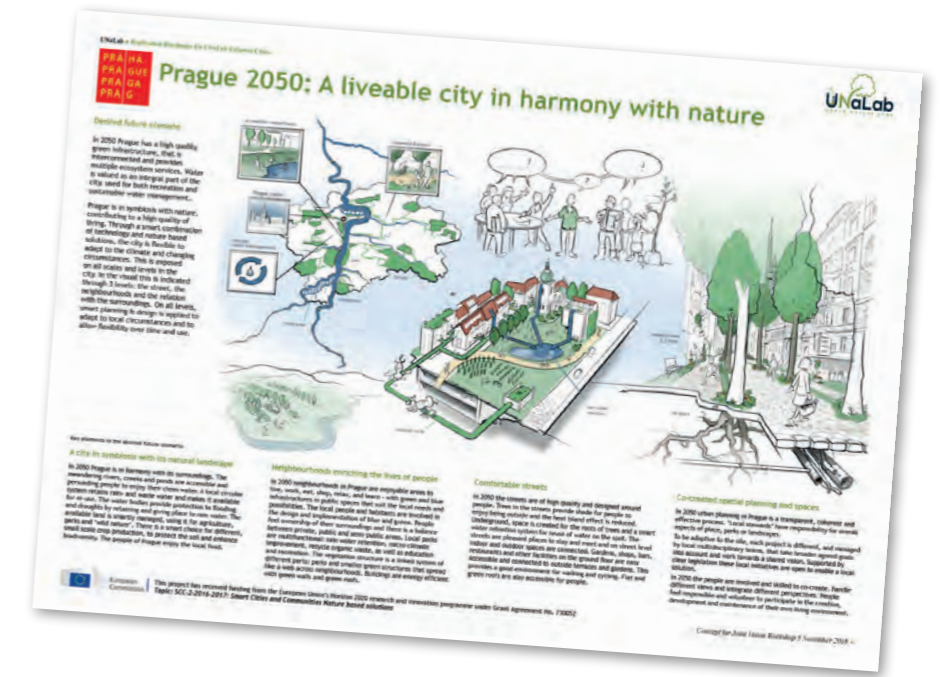
PRA HA  
PRA GUE  
PRA GA  
PRA G







Results of the systems analysis in Prague



The desired future scenario for Prague

#### 4.4. Roadmap Prague

The roadmap workshop in Prague was held on 9 and 10 October 2019. The starting point was the ambition of Prague to achieve a liveable city in harmony with nature by 2050.

Prague selected two **NBS interventions** for the discussion during the first day of the roadmap workshop:

Which NBS can create comfortable streets in the historical city centre, with shade and water retention systems, that enhance the quality and liveability of the historical setting?

Which NBS can create comfortable spaces in block structure neighbourhoods of the wider city centre, with shade and water retention systems?

Based on the results of the system analysis and the analysis of the barriers identified by the groups working on the NBS interventions during the first day of the workshop, two **Governance interventions** were defined for the discussions during the second day of the workshop:

How to facilitate cross-departmental collaboration in a way that contributes to a clear division of responsibility?

How to support openness towards innovative approaches and solutions and to boost creative capacity for change?

The summary of the resulting roadmap of the workshops is presented on the next page.





# ROADMAP – NATURE-BASED SOLUTIONS FOR CLIMATE & WATER RESILIENCE

## MILESTONES

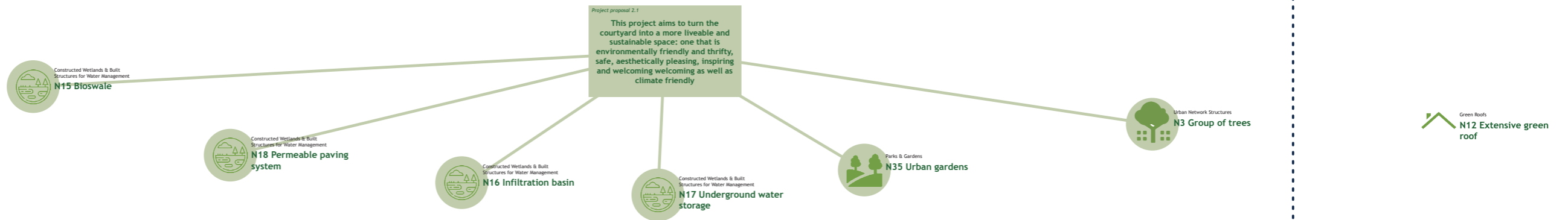
- Functional implementation of green-blue infrastructure in a street in Prague
- Changed value of the lower part of the courtyard
- Administrator also responsible for communication and PR issues, more competences for administrators
- Local government system implemented in several public spaces

## NBS INTERVENTIONS

Which NBS can create comfortable streets in the historical city centre, with shade and water retention systems, that enhance the quality and liveability of the historical setting?



Which NBS can create comfortable spaces in block structure neighbourhoods of the wider city centre, with shade and water retention systems?



## GOVERNANCE INTERVENTIONS

How to facilitate cross-departmental collaboration in a way that contributes to a clear division of responsibility?



How to support openness towards innovative approaches and solutions and to boost creative capacity for change?



2019

2025

- Green parks as façades and as roofs of buildings, reviving courtyard, functional system of rainwater management
- Changes in the 'upper' part of the courtyard, increasing effectiveness, aesthetic functions
- Manage the site as a whole (investments, PR, communication)
- System structure for local managers, more budget for maintenance, less for investment

Constructed Wetlands & Built Structures for Water Management

Rain garden



Constructed Wetlands & Built Structures for Water Management

N16 Infiltration basin



Urban Network Structures

N5 Green corridors



Green Walls

N6 Green facades



Green Roofs

N11 Intensive green roof

Establish mechanisms to financing across departments



Municipal Strategy & Planning

G6 Use of blue-green factors



Inclusive Urban Development

G24 Linking social development strategies with green space planning



Policies

G12 Introducing NBS-supportive building regulations



Finance & Procurement

G20 Reconfigure fees and other charges to reflect the costs and benefits associated with NBS

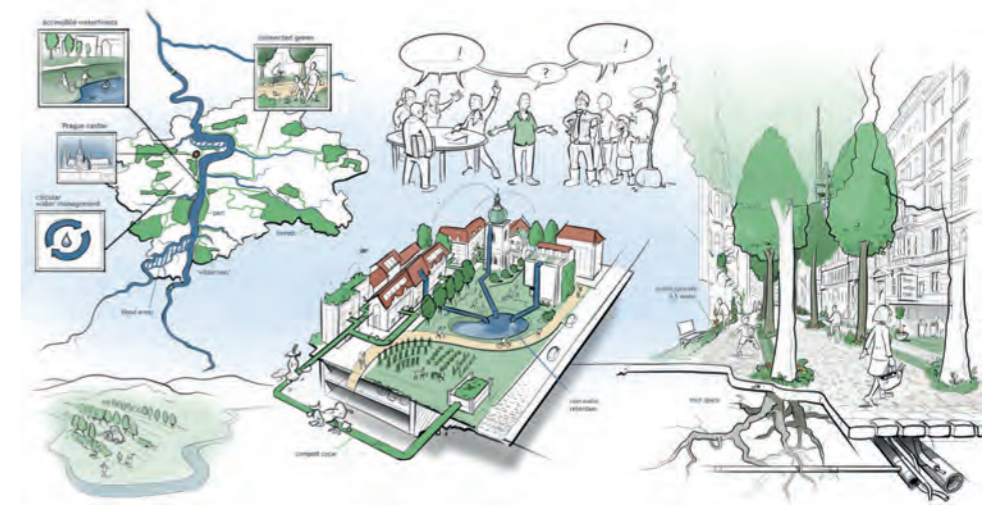
2035

2050

Roadmap: final version 5 February 2020

Vision: final version 30 April 2019

## Prague 2050: A liveable city in harmony with nature



### Desired future scenario

In 2050 Prague has a high-quality green infrastructure that is interconnected and provides multiple ecosystem services. Water is valued as an integral part of the city, used for both recreation and sustainable water management.

Prague is in symbiosis with nature, contributing to a high quality of living. Through a smart combination of technology and nature-based solutions, the city is flexible to adapt to the climate and changing circumstances. This is shown at all scales and levels in the city. In the visual this is indicated at 3 levels: the street, the neighbourhoods and the relationship with the surroundings. Smart planning & design are applied at all levels, to adapt to local circumstances and to allow flexibility over time and use.

### Key elements in the desired future scenario:

#### A city in symbiosis with its natural landscape

In 2050 Prague is in harmony with its surroundings. The meandering rivers, creeks and ponds are accessible and persuade people to enjoy their clean water. A local circular system retains rain- and waste water and makes it available for re-use. The water bodies provide protection against flooding and drought by retaining and providing space for rainwater. The available land is smartly managed, using it for agriculture, parks and 'wild nature'. There is a smart choice for different, small-scale crop production, to protect the soil and enhance biodiversity. The people of Prague enjoy the local food.

#### Neighbourhoods enriching the lives of people

In 2050 neighbourhoods in Prague are enjoyable areas to live, work, eat, shop, relax and learn - with green and blue infrastructure in public spaces that suit the local needs and possibilities. The local people and residents are involved in the design and implementation of green and blue. People feel ownership of their surroundings and there is a balance between private, public and semi-public areas. Local parks are multifunctional: rainwater retention, micro-climate improvement and recycling organic waste, as well as education and recreation. The vegetation structure is a linked system of different parts: parks and smaller green structures that spread like a web across neighbourhoods. Buildings are energy efficient, with green walls and roofs.

#### Comfortable streets

In 2050 the streets are of high quality and designed around people. Trees in the streets provide shade for people to enjoy being outside and reduce the heat island effect. Underground, space is created for the roots of trees and a smart water retention system for re-use of water on the spot. The streets are pleasant places to stay and meet, and indoor and outdoor spaces are connected at street level. Gardens, shops, bars, restaurants and other facilities on the ground floor are easily accessible and connected to outdoor terraces and gardens. This provides a good environment for walking and cycling. Flat and green roofs are also accessible for people.

#### Co-created spatial planning and spaces

In 2050 urban planning in Prague is a transparent, coherent and effective process. 'Local stewards' have responsibility for overall aspects of places, parks and landscapes. To be adaptive to the site, each project is different, and managed by local multidisciplinary teams that take broader agreed goals into account and work towards a shared vision. Supported by clear legislation, these local initiatives are open to enable local solutions. In 2050 the people are involved and skilled to co-create, handle different views and integrate different perspectives. People feel responsible, and volunteer to participate in the creation, development and maintenance of their own living environment.

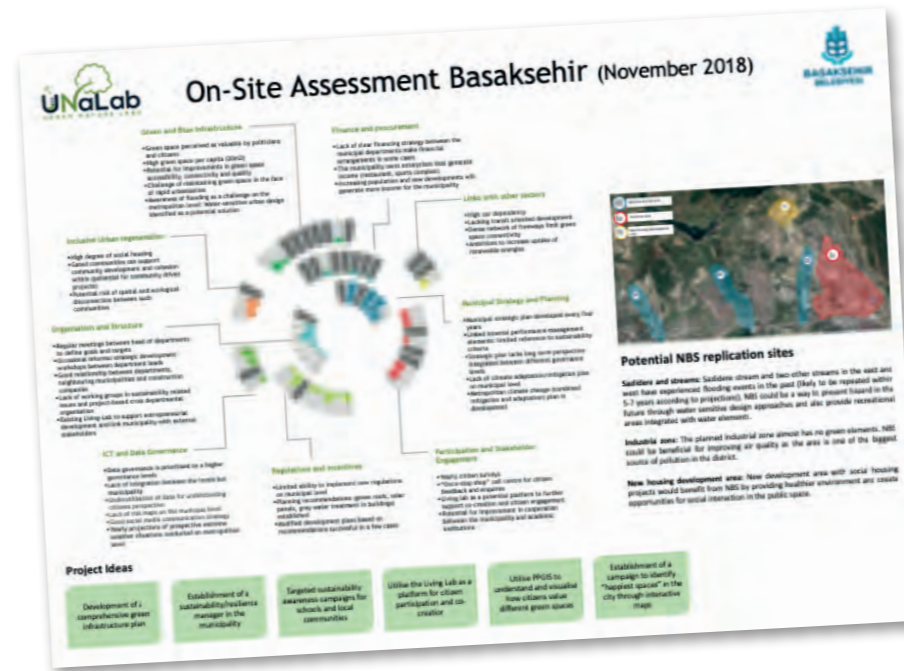


This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052. Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions









Results of the systems analysis in Başakşehir



The desired future scenario for Başakşehir

#### 4.5. Roadmap Başakşehir

The roadmap workshop in Başakşehir was held on 14 and 15 November 2019. The starting point was the ambition of Başakşehir to achieve a smart city for happiness and well-being by 2050.

Başakşehir selected three **NBS interventions** for the discussion during the first day of the roadmap workshop:

Which NBS (green & blue) can improve the green space quality, connectivity and accessibility in the Eşkinöz Valley?

Which NBS can maximise the use of rain water and (re-cycled) waste water to achieve 0-waste in the buildings of municipality?

Which NBS can increase biodiversity and at the same time enhance their educational aspect in Şamlar park?

Based on the results of the system analysis and the analysis of the barriers identified by the groups working on the NBS interventions during the first day of the workshop, one **Governance intervention** was defined for the discussions during the second day of the workshop:

How to create an organisational unit in the municipality that is focused on environmental and NBS issues to allocate clear responsibility and embed sustainability?

The summary of the resulting roadmap of the workshops is presented on the next page.



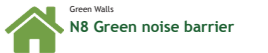
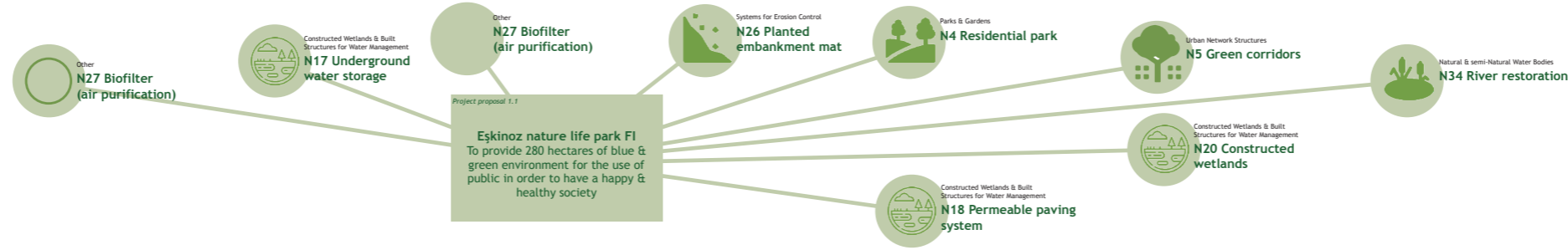
# ROADMAP – NATURE-BASED SOLUTIONS FOR CLIMATE & WATER RESILIENCE

## MILESTONES

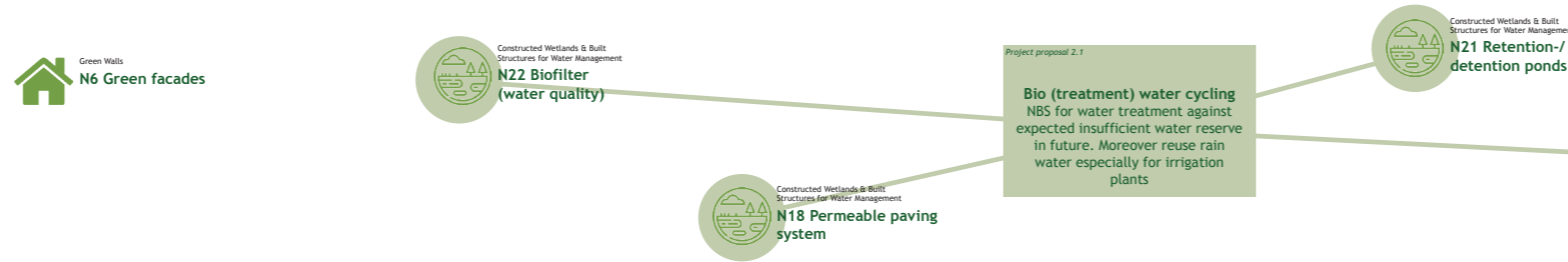
- Waste target (0,5 kg)
- Waste separation units: 5 units
- CO2
- 36 new parks – 10 hectare

## NBS INTERVENTIONS

Which NBS (green & blue) can improve the green space quality, connectivity and accessibility in the Eşkinöz Valley?



Which NBS can maximise the use of rain water and (re-cycled) waste water to achieve 0-waste in the buildings of municipality?

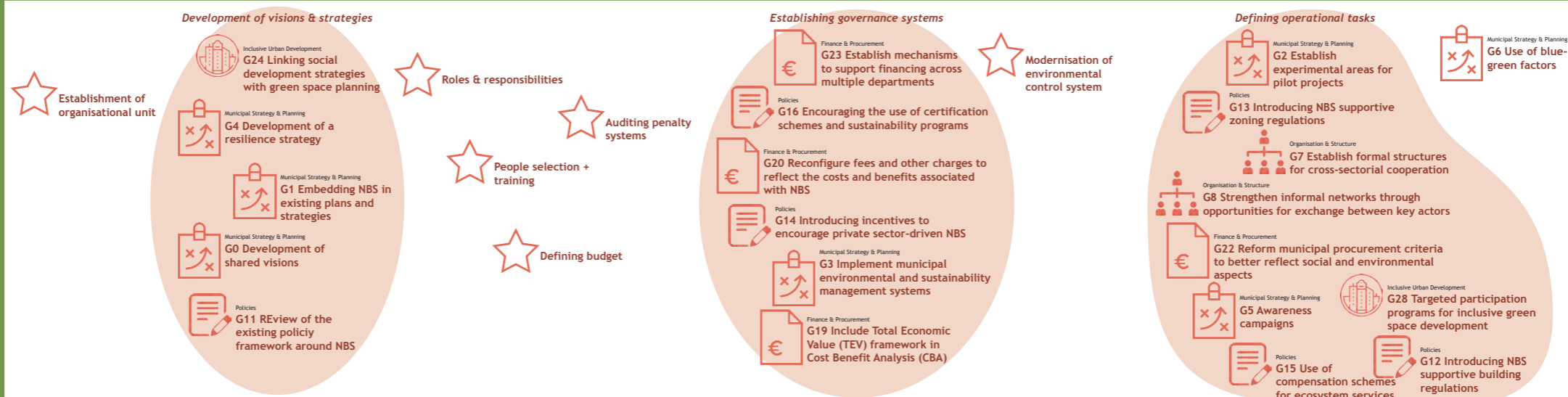


Which NBS can increase biodiversity and at the same time enhance their educational aspect in Şamlar park?



## GOVERNANCE INTERVENTIONS

How to create an organisational unit in the municipality that is focused on environmental and NBS issues to allocate clear responsibility and embed sustainability?



2019

2025

• To be the top 3 environmentally friendly liveable city with 30 m<sup>2</sup> / per person green area



Green Walls  
N7 Living wall



Green Roofs  
N12 Extensive green roof



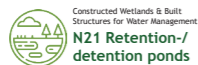
Constructed Wetlands & Built Structures for Water Management  
N17 Underground water storage



Urban Network Structures  
N3 Group of trees



Constructed Wetlands & Built Structures for Water Management  
N22 Biofilter (water quality)



Constructed Wetlands & Built Structures for Water Management  
N21 Retention-/detention ponds



Arboretum with plants and trees from all over the world

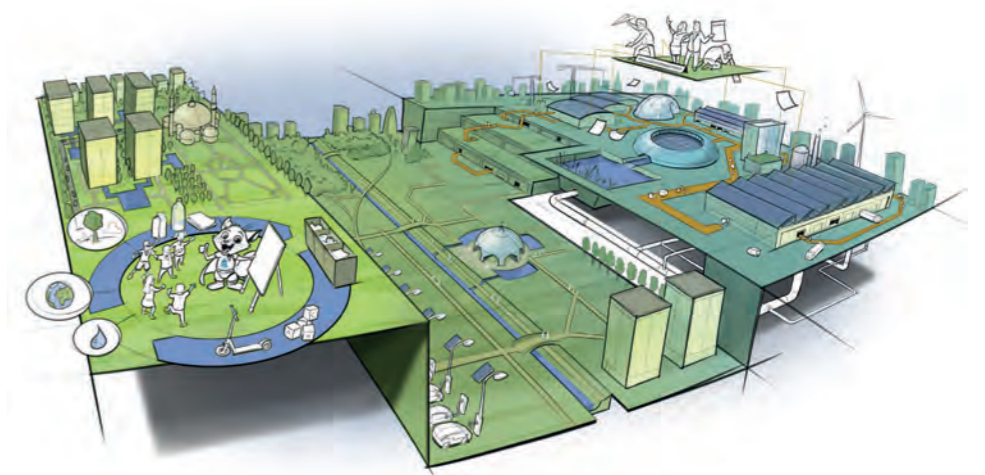
2035

Roadmap: final version 5 February 2020

2050

Vision: final version 30 April 2019

## Başakşehir 2050: Smart city of happiness and well-being



### Desired future scenario

In 2050 Başakşehir is a green and sustainable city, where people live in harmony with nature and enjoy green spaces, smell the fresh air and hear the sounds of nature. The city is well-planned with a balance between buildings and uninterrupted nature.

People enjoy the trees along paths, green river beds and water areas, which invite walking and cycling. People are environmentally aware and protect nature as their home.

The city is leading in waste recycling with nature-based solutions, resulting in zero waste. Water is valued and not one drop is wasted. The city is self-sufficient in energy from renewable sources, and people respect the use of water, energy and other natural (re)sources.

### Key elements in the desired future scenario:

#### Sustainable awareness and behaviour

In 2050 the people of Başakşehir respect natural sources and act responsibly in the use and re-use of water, waste and energy. Through an educational programme, children know the value of resources from an early age, and understand the positive effects of nature and a clean environments on their daily lives and health. Houses are designed with solutions to support sustainable behaviour and include, for instance, separation bins for waste collection and filtering taps for drinking water.

#### Accessible green and water areas

The city planning concept guarantees shared accessibility to green spaces within walking distance of people's homes. Houses are built using the slopes and integrating green areas, accessible for people to enjoy or use for urban farming. Parks and 'wild nature' are always nearby. They contain water retention ponds, and offer people the necessary space for recreation and sports.

#### Clean and sustainable industrial areas

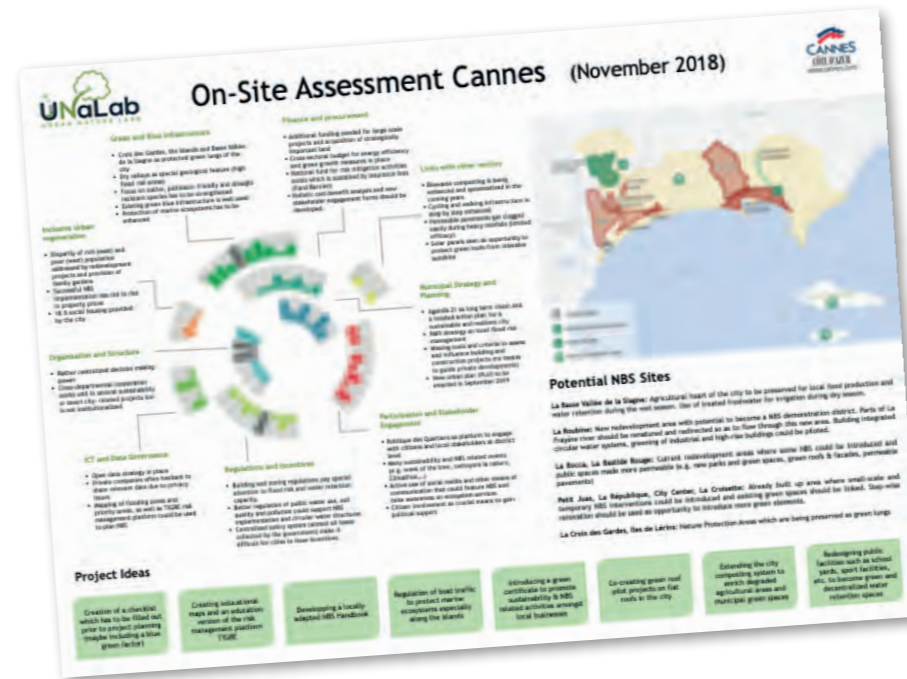
Nature-based solutions contribute to shared services for circular systems in industrial areas. A 'resource management board' provides incentives and advice to companies to use less resources or to use natural resources. By coordinating companies' needs, they can together create more circular systems. The resource manager can play a role in matching supply and demand.

All water (rainwater, industrial waste and chemically polluted water) is collected and treated in the area and re-used for industrial purposes. Industrial waste management is used to optimise re-use and recycling as well as maximising the use of renewable energy, e.g. by solar panels on the roofs of industrial buildings.









Results of the systems analysis in Cannes



The desired future scenario for Cannes

## 4.6. Roadmap Cannes

The roadmap workshop in Cannes was held on 5 and 6 December 2019. The starting point was the ambition of Cannes to achieve a green, safe and pleasant city by 2050.

Cannes selected four **NBS interventions** for the discussion during the first day of the roadmap workshop:

Which NBS can enable water retention while keeping the glamorous identity of the city centre and protect the coast from storm waves?

Which NBS will contribute to quality of the public space and smart water retention systems to buffer for dry periods in Petit Juas, la Republique and La Bocca (districts in renovation)?

Which NBS will enable La Roubine to become a resilient and green ecoquartier & showcase for NBS and improve green and blue space quality and accessibility along the Frayère river (Cannes Grand Ouest Project)?

Which NBS can enable water retention during heavy rainfalls and availability of clean water for use in agriculture in Basse Vallée de la Siagne?

Based on the results of the system analysis and the analysis of the barriers identified by the groups working on the NBS interventions during the first day of the workshop, two **Governance interventions** were defined for the discussions during the second day of the workshop:

How to create a green mentality and make sure that NBS are directly integrated in urban planning?

How to find sustainable financing for implementing NBS in the city?

The summary of the resulting roadmap of the workshops is presented on the next page.





# ROADMAP – NATURE-BASED SOLUTIONS FOR CLIMATE & WATER RESILIENCE

## MILESTONES

- Municipal strategies including NBS in every stage (from vision to building it)
- Green roofs & green walls around the city
- More permeable soils
- Green belt in 'Petit Juas' area
- More resilient 'Siagne Valley'

## NBS INTERVENTIONS

Which NBS can enable water retention while keeping the glamorous identity of the city center and protect the coast from storm waves?



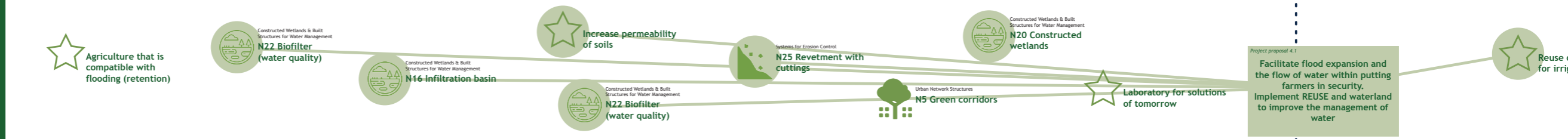
Which NBS will contribute to quality of the public space and smart water retention systems to buffer for dry periods in Petit Juas, la Republique and La Bocca (districts in renovation)?



Which NBS will enable La Roubine to become a resilient and green ecoquartier & showcase for NBS and improve green and blue space quality and accessibility along the Frayère river (Cannes Grand Ouest Project)?

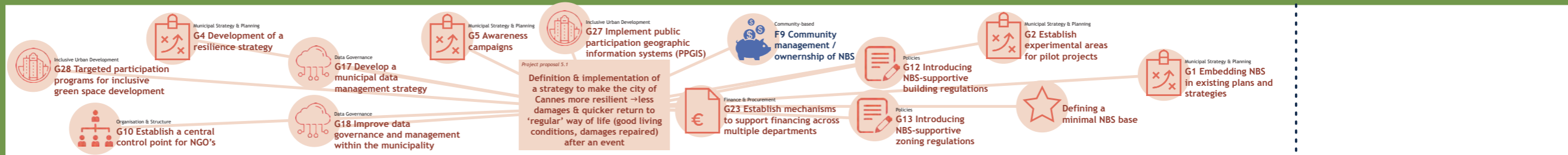


Which NBS can enable water retention during heavy rainfalls and availability of clean water for use in agriculture in Basse Vallée de la Siagne?

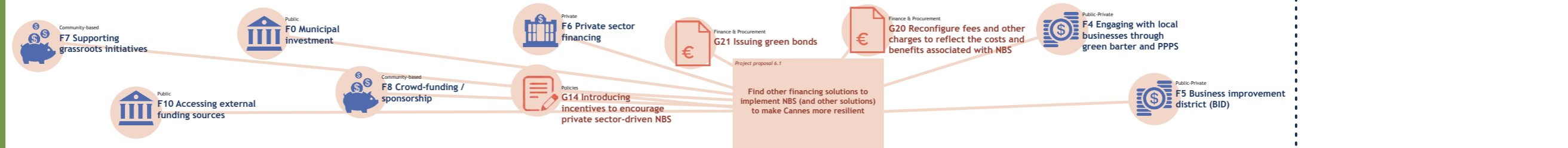


## GOVERNANCE INTERVENTIONS

How to create a green mentality and make sure that NBS are directly integrated in urban planning?



How to find sustainable financing for implementing NBS in the city?



2019

2025

- New construction projects (Grand Ouest) including NBS
- NBS strategies fully incorporated in municipality's procedures
- Stronger involvement of the inhabitants of Cannes in NBS in their day to day life

Green Roofs  
N12 Extensive green roofs

Green Walls  
N8 Green noise barrier

Green Roofs  
N11 Intensive green roofs

Constructed Wetlands & Built Structures for Water Management  
N17 Underground water storage

Urban Network Structures  
N5 Green corridors

Constructed Wetlands & Built Structures for Water Management  
N15 Bioswale

Urban Network Structures  
N3 Group of trees

Urban Network Structures  
N2 Boulevards

Parks & Gardens  
N35 Urban gardens

Constructed Wetlands & Built Structures for Water Management  
N17 Underground water storage

Constructed Wetlands & Built Structures for Water Management  
N19 Rain Garden

Systems for Erosion Control  
N25 Revetment with cuttings

Coastal Areas  
N32 Restoring offshore habitat

Green Roofs  
N12 Extensive green roofs

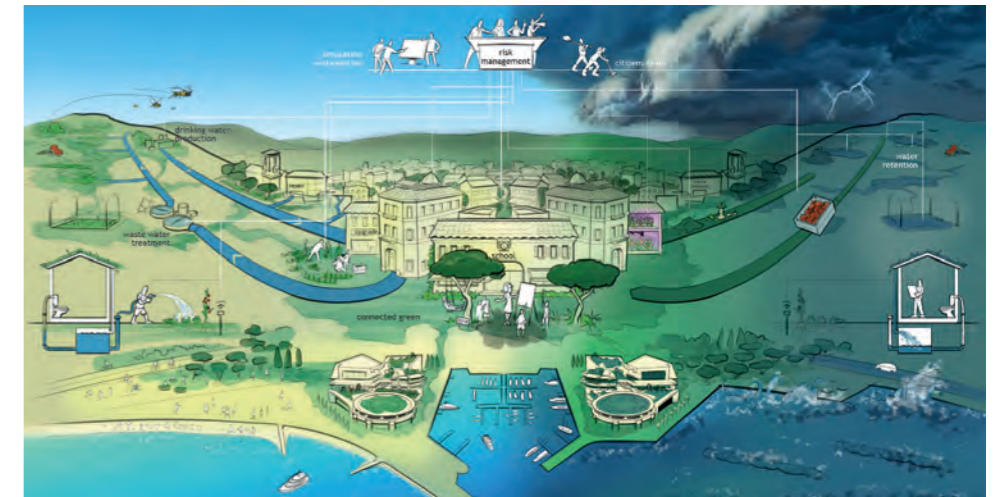
2035

Roadmap: final version 5 February 2020

2050

Vision: final version 30 April 2019

## CANNES 2050: A green, safe and pleasant city



### Desired future scenario

In 2050 Cannes is resilient to all natural and security threats, such as coastal erosion and flooding from extreme weather events. Nature based solutions provide a green, safe and pleasant city, both in the dry season (visualised on the left side of the picture) and severe storm events (visualised on the right).

Cannes is a green city, full of gardens and connected green spaces for people to walk, cycle and enjoy outdoor activities, contributing to the glamorous identity of Cannes.

Urban and surrounding areas are connected through agricultural areas, community gardens and a circular water system. This enables self-sufficiency in food supply. The wetlands in Basse Vallée de la Siagne retains rain- and waste water and make it available for re use.

Empowered people are the key to risk prevention, supported by the risk centre and TIGRE platform, facilitating continuous innovation through an evidence-based working approach.

### Key elements in the desired future scenario:

#### Greening the city

In 2050 Cannes is a green city, where the green spaces are connected and accessible to people for multi-purpose use. The green solutions deal with extended periods of dry weather and heavy rainfall. Green roofs and permeable surfaces retain water, and provide shade and pleasant areas for people to enjoy. Every house collects storm water for re-use in toilets and gardens. Smart water retention systems regulate the use of water, and buffers anticipate rainfall and usage patterns.

Densification is well-planned, based on a vision of the purpose, welfare and well-being of the area. La République has developed into a neighbourhood with high-quality facilities for families, and La Bocca is an economically vibrant neighbourhood based on creative industries attracting a diversity of people for studying, living and working.

#### Developing local agriculture

In 2050 the city is self-sufficient through local agriculture and water management. Water from the waste-water treatment system is brought upstream and re-used for agriculture. No water is wasted. The green areas, like the wetland in Basse Vallée de la Siagne, retain water on the spot. Smart retention systems manage water in both the dry season and times of storm. Agricultural areas in the surrounding villages and on the mountains are connected. Connected community gardens are shared for the benefit of everybody. In Basse Vallée de la Siagne and in the city, multilayer buildings combine shops and living areas, as well as roof gardens and floors dedicated to agriculture.

Agriculture is everywhere in the city, and is explicitly used for education on food and water waste. People make responsible choices and create their own resilient neighbourhoods.

#### Coastal resilience to storm waves

In 2050 the coast is resilient to storm waves. Nature-based solutions reduce the violence of the waves to protect the coast during storms. The coastal road and local restaurants are resistant to storm water flooding. Energy is harvested from the waves.

The coast is attractive for tourists. The green and trees provide shade, and people enjoy spending time there. Walking and cycling opportunities invite people to be active and healthy.

In 2050 the sea is clean, and the local fishing industry is flourishing. Eco-cruise ships no longer pollute the sea and the air, and clean solutions are used to bring people ashore.

#### Empowering people to prevent risk and waste

In 2050 the people of Cannes are aware of risks and the value of resources. The risk management system supports simulation and exercises for risk situations, and facilitates citizen initiatives in times of disasters. Citizens and municipality together reduce the impact of events.

Education is key to the awareness of no waste in water and food. School restaurants use local products and do not tolerate waste. Vegetable gardens are situated in and near the schools.

Waste is made visible through data and smart grid solutions, and people learn to repair, upgrade, share and re-use all types of products. Places are created for rental, storage and distribution, supported by a logistics structure (places and organisations) to make it very easy for people to re-use waste. These are open to citizens and local companies that can create new jobs.



European Commission  
This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052  
Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions



## 5. ANALYSIS OF THE ROADMAPS

To summarise the overall outcome of the follower city Roadmapping Process, a short analysis of all roadmaps was conducted. The results are presented on the following pages and include three layers:

### 1) Intervention areas

The chosen NBS and governance intervention areas from all city roadmaps were compiled and grouped according to the key challenges they addressed. The overview highlights the priorities that were established during the roadmapping process, as well as the main challenges that should be addressed by the resulting roadmaps. Paragraph 5.1 (page 47) shows the challenges addressed in the NBS intervention areas and paragraph 5.2 (page 49) the governance intervention areas.

### 2) Roadmap projects

The summary of the chosen and elaborated projects from each city are listed on pages 50 and 52. These summaries serve as starting points to identify similarities, synergies and opportunities for collaboration among the cities.

### 3) Chosen NBS and governance actions

Finally, the number of times a specific NBS or governance inspiration card was selected in each roadmap was counted. The evaluation graphs show the aggregated numbers for:

- The categories according to the UNaLab Technical Handbook and the UNaLab Municipal Governance Guidelines, and
- The individual NBS and governance actions. Additional solutions and elements that the participants identified and noted down during the workshops are also listed for reference.

The results from all three layers were used to identify joint areas of interest, to prepare the joint roadmapping sessions, and to inform future city-to-city exchange and UNaLab buddy system activities.

### 5.1. Chosen NBS Intervention Areas

The list in the next column presents the key challenges and the respective elements from the individual interventions areas in the UNaLab follower cities. These are direct quotes from the intervention areas of the cities. To be complete, we also kept elements that were mentioned twice or that are similar to each other.

Goal of this section is to represent a short collection of the topics that were stressed and found important by the cities, rather than a scientific collection of climate-related challenges.

Key challenges and the respective elements from the intervention areas in the UNaLab follower cities:

#### ● Flood prevention

- Storm wave protection
- Water retention systems
- Reduction of stormwater inflow into combined sewer systems
- Prevention of stormwater flooding
- Enable water retention during heavy rainfalls

#### ● Water reuse

- Availability of clean water for use in agriculture
- Smart water retention systems to buffer for dry periods
- Circular water systems for purified wastewater
- Circular systems for water and waste
- Maximise the use of rain water and (re-cycled) wastewater

#### ● Agriculture

- Prevent stormwater flooding of farm land
- Smart water retention systems to buffer for dry periods
- Availability of clean water for use in agriculture
- Make the place attractive for agriculture
- Local food production in the Green agricultural ring

#### ● Biodiversity

- Increase nature and biodiversity
- Enhance biodiversity
- Improve green and blue space quality

















#### ● Townscape / Identity

- Enhance the quality and liveability of the historical setting
- keeping the glamorous identity of the city centre

#### ● Well-being

- Create healthy green spaces for people
- Make the place attractive for recreation
- Create comfortable space for active and vital employees
- Improve social cohesion
- Improve air quality and reduce heat stress, so people enjoy walking and cycling through the city

Challenges addressed in the NBS intervention areas selected by the cities






 <p>Which NBS can introduce nature (water &amp; green) in the city centre to create healthy green spaces for people and enhance biodiversity, while at the same time reducing storm water inflow to the sewer system?</p>	 <p>Which NBS will enable water retention, during heavy rainfall and circular water systems for purified waste water, in the wetlands and the river and make the place attractive for recreation and useful for agriculture?</p>	 <p>Which NBS can create comfortable streets in the historical city centre, with shade and water retention systems, that enhance the quality and liveability of the historical setting?</p>	 <p>Which NBS (green &amp; blue) can improve the green space quality, connectivity and accessibility in the Eşkinöz Valley?</p>	 <p>Which NBS can enable water retention while keeping the glamorous identity of the city centre and protect the coast from storm waves?</p>
 <p>Which NBS can prevent storm water flooding from recreational areas and farm land upstream of residential areas, such as Sørmarka, while at the same time increasing nature and biodiversity as a co-benefit?</p>	 <p>Which NBS can improve air quality and reduce heat stress, so people enjoy walking and cycling through the city (Ermitas, Puente rio seco, city center, avd. del Mar, Paseo Morella, Parque Ribalta)?</p>	 <p>Which NBS can create comfortable spaces in block structure neighbourhoods of the wider city centre, with shade and water retention systems?</p>	 <p>Which NBS can maximise the use of rain water and (re-cycled) waste water to achieve 0-waste in the buildings of municipality?</p>	 <p>Which NBS will contribute to quality of the public space and smart water retention systems to buffer for dry periods in Petit Juas, la Republique and La Bocca (districts in renovation)?</p>
 <p>Which NBS can reduce storm water inflow into combined sewer systems with low capacity and potential overflows to the sea, in the Mariero area while at the same time providing other co-benefits to the area?</p>	 <p>Which NBS will improve social cohesion and local food production in the Green agricultural ring around the city centre?</p>	 <p>Which NBS can increase biodiversity and at the same time enhance their educational aspect in Şamlar park?</p>	 <p>Which NBS will enable La Roubine to become a resilient and green eco-quartier &amp; showcase for NBS and improve green and blue space quality and accessibility along the Frayère river (Cannes Grand Ouest Project)?</p>	
<p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li><span style="color: yellow;">●</span> Flood prevention</li> <li><span style="color: blue;">●</span> Water reuse</li> <li><span style="color: green;">●</span> Agriculture</li> <li><span style="color: red;">●</span> Biodiversity</li> <li><span style="color: orange;">●</span> Townscape / Identity</li> <li><span style="color: purple;">●</span> Well-being</li> </ul>	 <p>Which NBS will enable circular systems for water and waste and create comfortable space for active and vital employees in the industrial areas of Serrallo Polygon and Ciudad del Transporte?</p>	 <p>Which NBS can enable water retention during heavy rainfalls and availability of clean water for use in agriculture in Basse Vallée de la Siagne?</p>		

*Note: the descriptions of the interventions are copied exactly from the workshop results to ensure maximum recognition for the participants. We apologise for occasional grammar mistakes or deviations in use of terminology.*











## 5.2. Chosen governance intervention areas






Key challenges:

-  Financing
-  Collaboration & Co-Creation
-  Organisation & Structure
-  Responsibility
-  Knowledge & Awareness

Challenges addressed in the governance intervention areas selected by the cities

 <p>How to facilitate cross-departmental and external collaboration for NBS to make sure we achieve the potential co-benefits and financing?</p>	 <p>How to facilitate cross-departmental collaboration and smoothen administrative processes for NBS?</p>	 <p>How to facilitate cross-departmental collaboration in a way that contributes to a clear division of responsibility?</p>	 <p>How to create an organisational unit in the municipality that is focused on environmental and NBS issues to allocate clear responsibility and embed sustainability?</p>	 <p>How to create a green mentality and make sure that NBS are directly integrated in urban planning?</p>
 <p>How to increase awareness and engagement of citizens and other external stakeholders in NBS, biodiversity and climate change adaptation?</p>	 <p>How to support openness towards innovative approaches and solutions and to boost creative capacity for change?</p>	 <p>How to find sustainable financing for implementing NBS in the city?</p>		

**Challenges:**

-  Financing
-  Collaboration & Co-Creation
-  Organisation & Structure
-  Responsibility
-  Knowledge & Awareness



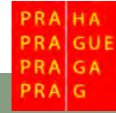



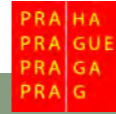








*Note: the descriptions of the interventions are copied exactly from the workshop results to ensure maximum recognition for the participants. We apologise for occasional grammar mistakes or deviations in use of terminology.*





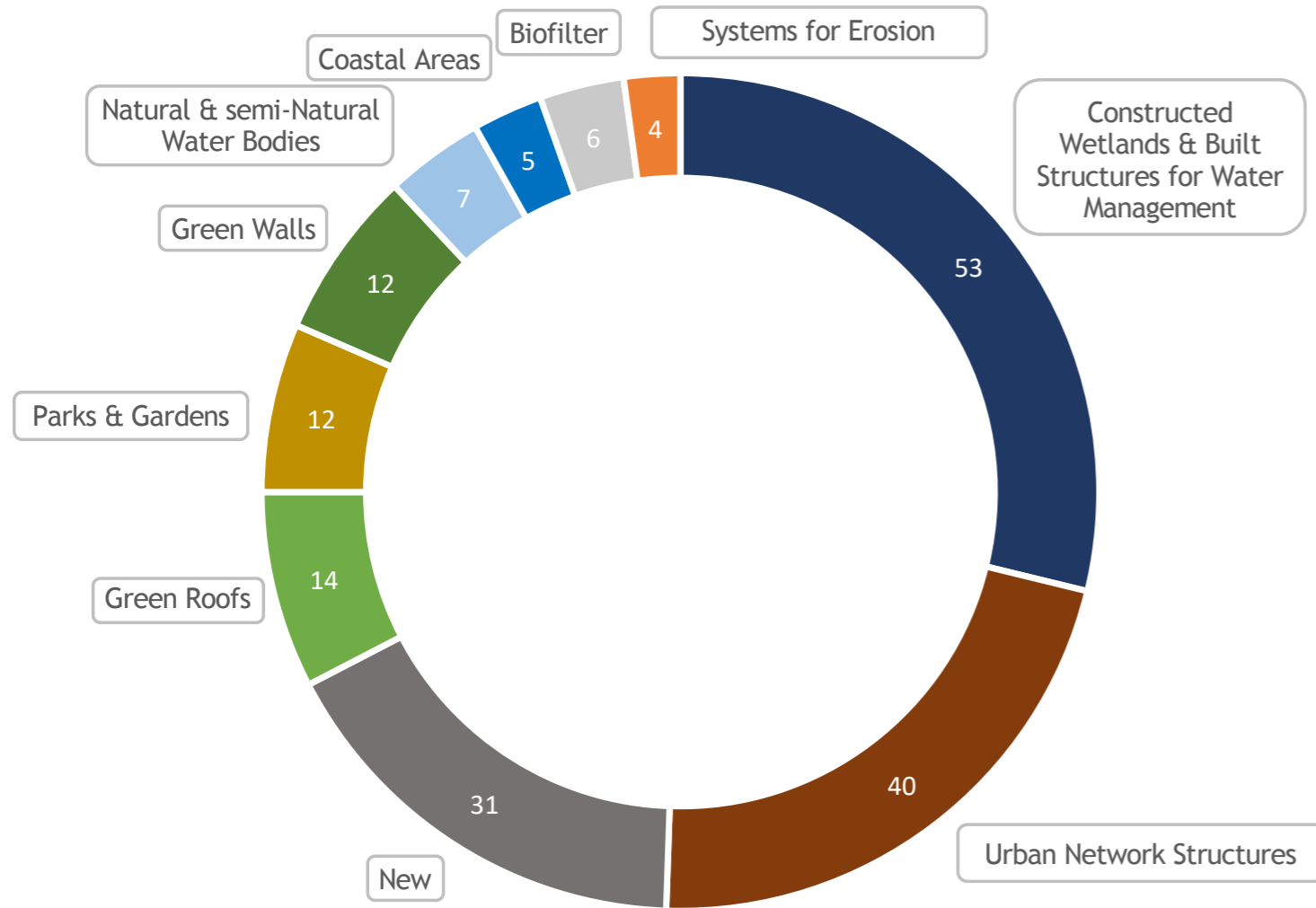
### 5.3. NBS Projects

On this page an overview of all NBS projects is given.

 <p>Disconnecting stormwater runover from roofs: private &amp; public buildings</p>	 <p>Green areas &amp; sustainable food. The importance of creating a new green area: automating all process to absorb CO<sub>2</sub> and provide local and green jobs</p>	 <p>Pilot project of green and blue infrastructure in Prague Žižkov.</p>	 <p>Eşkinöz nature life park FI To provide 280 hectares of blue &amp; green environment for the use of public in order to have a happy &amp; healthy society</p>	 <p>A pedestrian &amp; green Croisette would allow inhabitants of Cannes and the tourists (professional &amp; leisure) to enjoy the city, united, respecting its Provençal roots. The area of La Croisette would be more lively, enjoyable &amp; more profitable for shop owners and restaurants, benefiting from more people walking around in a naturally cooled area</p>
 <p>More people, more green: attractive place by introducing urban nature solutions</p>	 <p>Solutions for storing rain water in underground reservoir for reusing in urban areas - implementation of the pilot project in urban areas</p>	 <p>This project aims to turn the courtyard into a more liveable and sustainable space: one that is environmentally friendly and thrifty, safe, aesthetically pleasing, inspiring and welcoming as well as climate friendly</p>	 <p>Bio (treatment) water cycling NBS for water treatment against expected insufficient water reserve in future. Moreover reuse rain water especially for irrigation plants</p>	 <p>Creation of a green corridor with a water retention basin</p>
 <p>The Sørmaka Back and Forrest project will combine tree planing and wetlands projects to manage stormwater and increase biodiversity in Sørmaka North West</p>	 <p>Green connection Connect &amp; integrate industrial area and the city in a green environment</p>	 <p>Green future To create specifically designed green areas - parks inside Şamlar N.P. and increase biodiversity and awareness of citizens about nature and climate change</p>	 <p>Flood prevention through the new natural direction of the Frayere river's end combined with the new development of the regional train station</p>	
 <p>Renaturation of the Rio Seco Transversal and vertical connection of the city promoting sustainable mobility by revitalising and green the Rio Seco creating spaces for people and environment using NBS</p>	 <p>Facilitate flood expansion and the flow of water within putting farmers in security. Implement REUSE and water land to improve the management of water?</p>			

### 5.3.1. Most chosen NBS categories

An analysis of the roadmaps has been done to identify which NBS categories have been selected for implementation. The graph shows the results of the analysis, including the number of times each category was selected for the replication roadmaps.

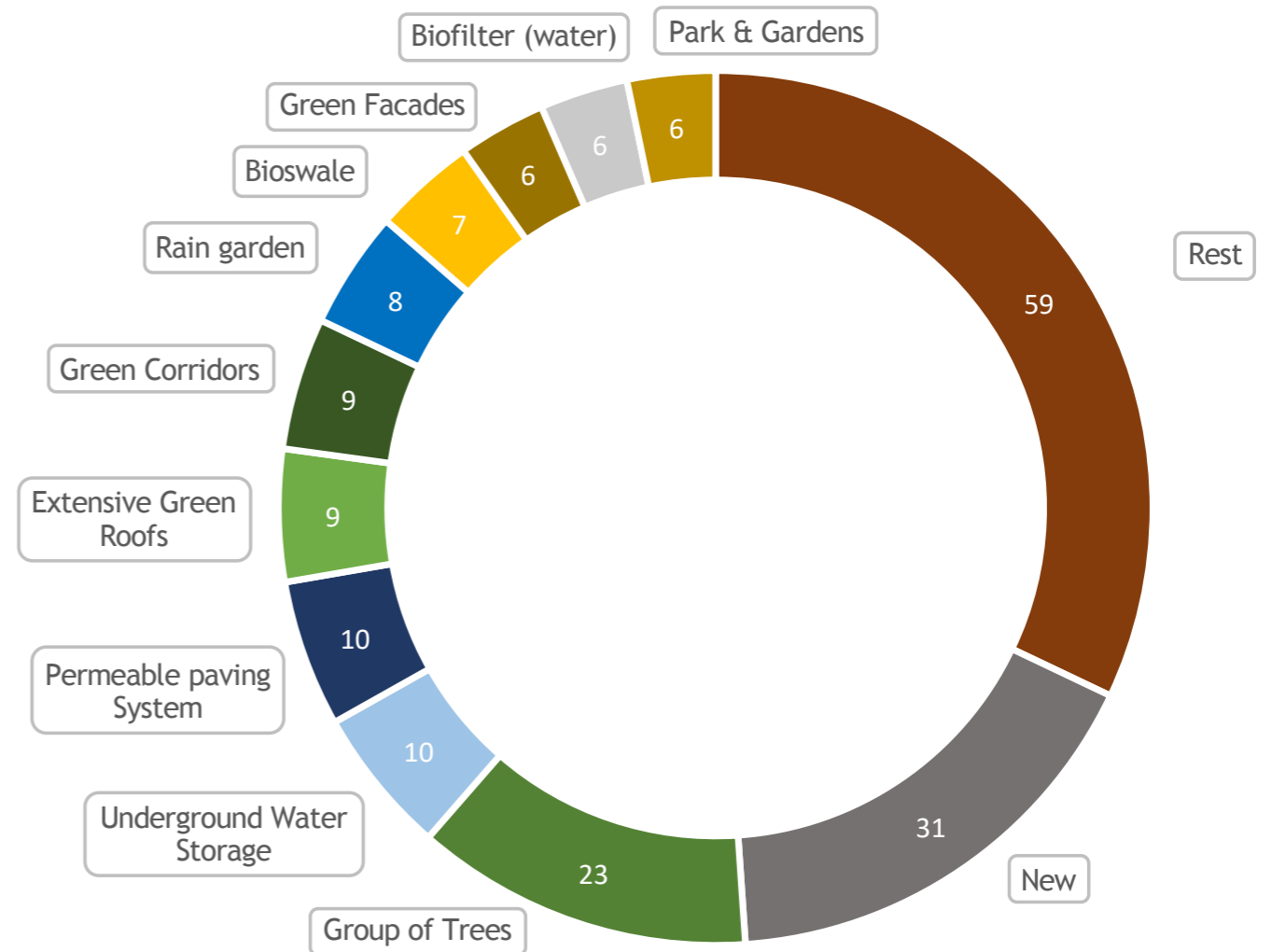


### 5.3.3. Newly added solutions:

- Water theme for kids in botanical garden
- Boardwalk instead of permeable path
- Constructed beck with lav dams (referring to a series of connected small ponds)
- Twig dams
- Constructed marshlands
- Masterplan blue/green structures
- Depaving
- Disconnecting roof runoff
- Store water in roundabouts
- Super blocks
- Arboretum with plants and trees from all over the world
- Solid pontoons to limit erosion
- Urban agriculture
- Agriculture compatible with water retention
- Increase permeability of soil
- Reuse of wastewater for irrigation

### 5.3.2. Most chosen NBS

An analysis of the roadmaps has been done to identify which specific NBS solutions have been selected for implementation. The graph shows the results of the analysis, including the number of times each solution was selected for the replication roadmaps. Additional solutions, which were not covered by the UNaLab Technical Handbook, but specified by the workshop participants are summarised under the category "new" and specified in 5.3.3.



### 5.3.4. NBS chosen in all 5 cities:

- Group of Trees
- Extensive Green Roofs
- Permeable Paving System

*Note: the NBS inspiration cards are based on the first version of the Technical Handbook. More recently the European Commission revised the list of what is considered NBS, some of the solutions mentioned here do no longer fit the new criteria for NBS (e.g., permeable paving systems).*





### 5.4. Governance Projects

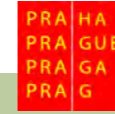
On this page an overview of all governance projects is given.



Development of a municipal management system for sustainability and environment and the development of a learning co-operating organisation



A strategy for the sustainable development objectives 2030  
Transversal strategy for the interdepartmental and civil society coordination to implement the sustainable objectives of the agenda 2030



This project aims to test a joint management of the 'Seifertora and its surroundings' site approach



Development of visions & strategies



Definition & implementation of a strategy to make the city of Cannes more resilient; less damages & quicker return to 'regular' way of life (good living conditions, damages repaired) after an event



A user-friendly, easy accessible incentive package to cater for NBS in neighbourhoods, through co-creation and bottom-up initiatives. Citizens will be happier, save money and we will have more diversity and less water damage for less public spending



Sustainable organisation support (S.O.S.)  
Create regional platform to support municipalities & departments to share experience and overcome climate risks & sustainability problems. Initiate guidelines for the new directional plan



Enabling governance systems



Find other financing solutions to implement NBS (and other solutions) to make Cannes more resilient



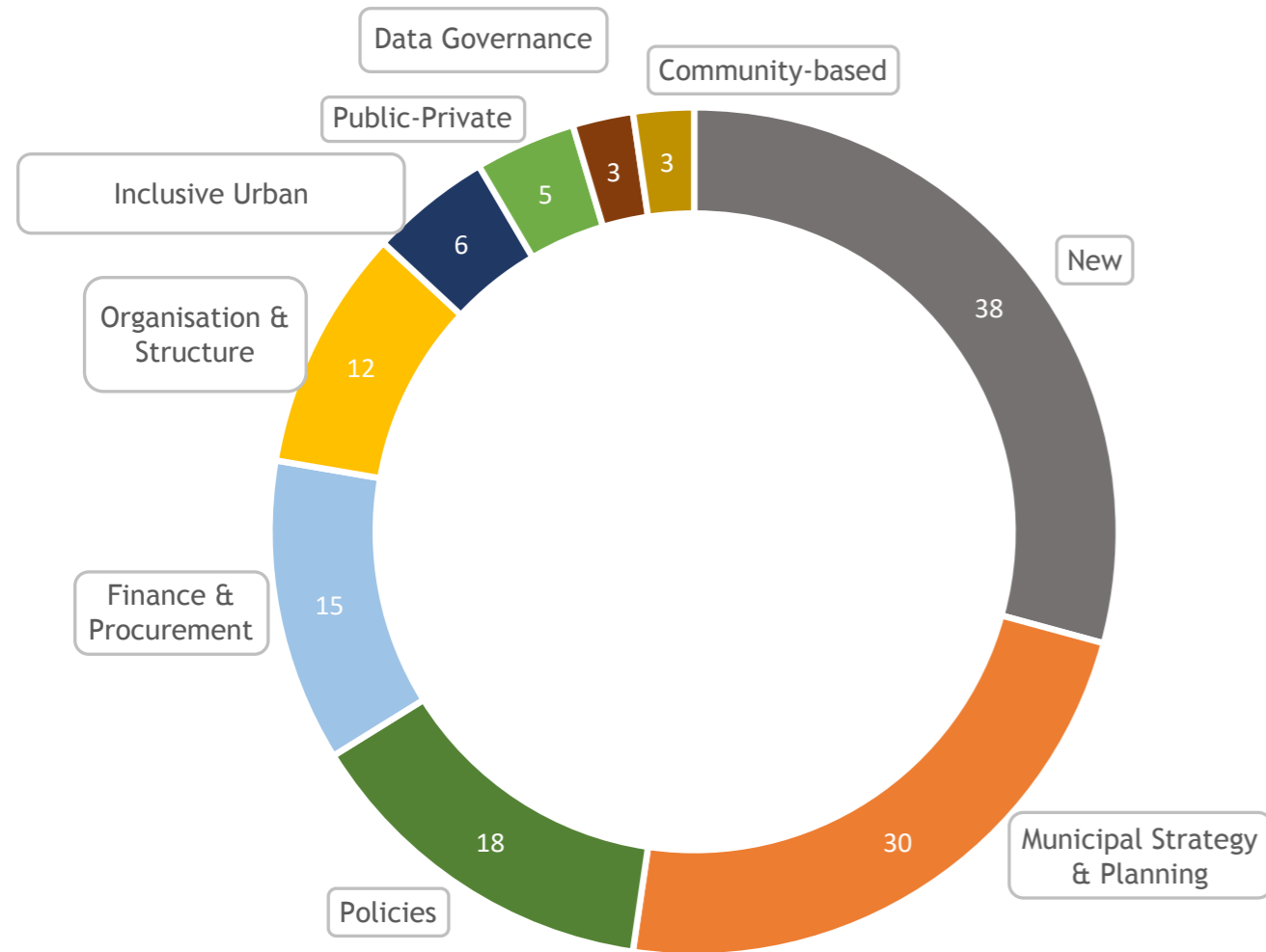
Defining operational tasks



Defining operational tasks

### 5.4.1. Most chosen governance categories

An analysis of the roadmaps has been done to identify which Governance categories have been selected for implementation. The graph shows the results of the analysis, including the number of times each category was selected for the replication roadmaps.

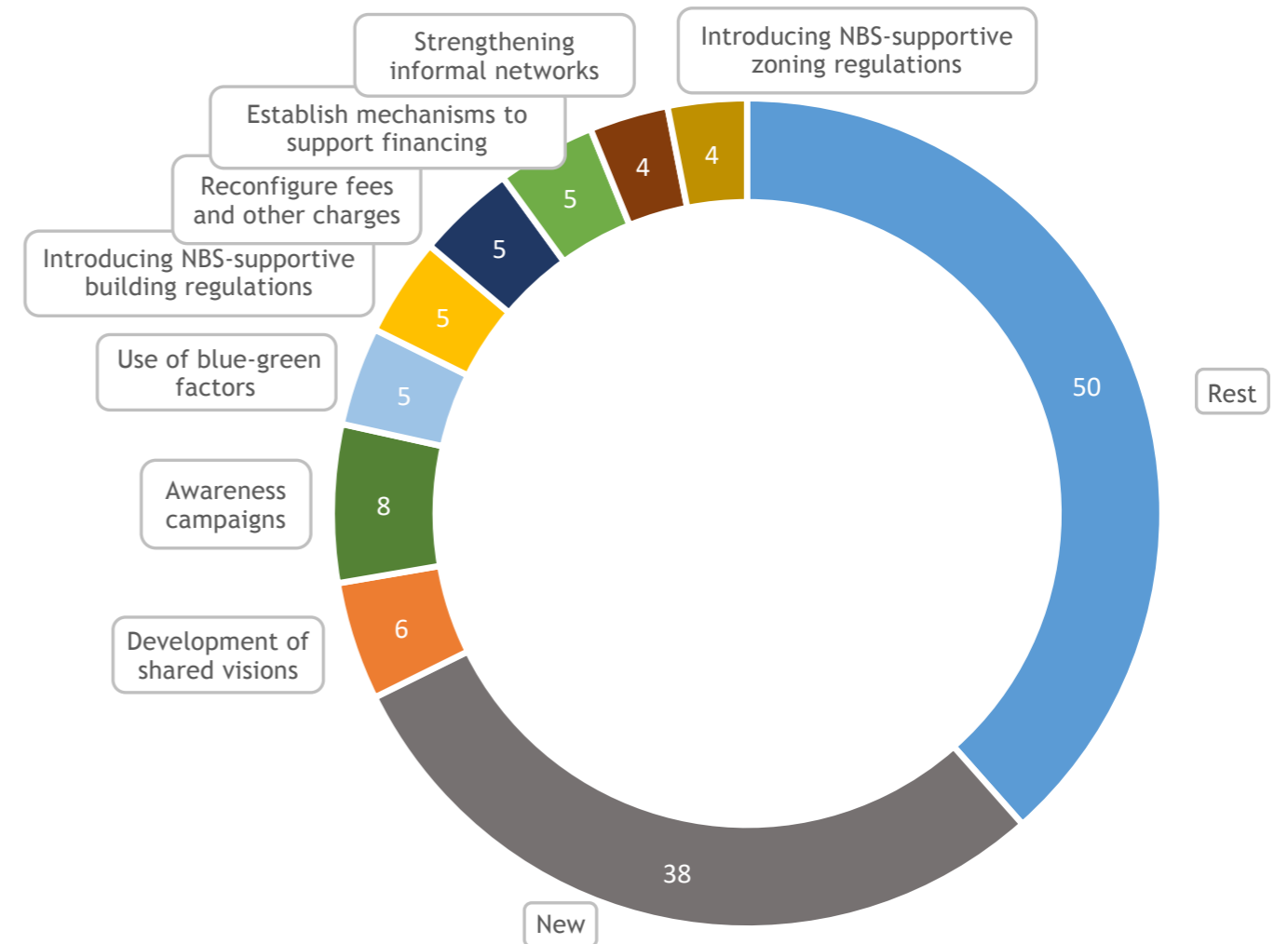


### 5.4.3. Newly added actions

- Multi-benefit analysis of stormwater management
- Stricter pre-feasibility studies & impact assessments
- Create more opportunities for direct communication
- Development of indicators for sustainability and biodiversity
- Framework for co-creation with external partners
- Detect car inactivity to free up space
- Policies: stormwater guides and reduced water fees
- Rainbed course for consultants
- Incentive program for business
- Maintenance cost agreement
- Living labs
- Restrictions
- Regulations to save the trees in the city
- More responsibility to property owners
- Departmental/sector strategies
- Financial schemes

### 5.4.2. Most chosen governance actions

An analysis of the roadmaps has been done to identify which Governance Actions have been selected for implementation. The graph shows the results of the analysis, including the number of times each action was selected for the replication roadmaps. Additional solutions, which were not covered by the UNaLab Municipal Governance Guidelines, but specified by the workshop participants are summarised under the category "new" and specified in 5.4.3, using the exact formulation as used in the workshop results to avoid reinterpretation.



- Reinforcement of competencies and capabilities of site managers
- Professionalise approach to hire people for leadership positions
- Programme to exchange knowhow between city districts
- New position for local public manager
- New councillorship for common strategy
- GIS for urban planning and citizen participation
- Joint directory plan among municipalities in the region
- Establishment of organisational unit
- Auditing penalty systems
- Modernisation of environmental control system
- Defining a minimal NBS base

### 5.4.4. Governance action chosen in all 5 cities:

- Awareness campaigns





## 6. CONTRIBUTIONS

### 6.1. On-site assessments

- Tom Hawxwell, Sophie Mok – methodologies & roadmaps
- Tom Hawxwell, Sophie Mok, Claudius Schaufler – Stavanger
- Sophie Mok, Marielisa Padilla, Brenda Vaccari – Cannes
- Claudius Schaufler, Tom Hawxwell – Basaksehir
- Petr Suska, Mike Letzgus, Jill Theobald – Prague
- Marielisa Padilla, Eliana Uribe, Mattheus Kelson – Castellón

### 6.2. Participants in the Roadmap Workshops

#### 6.2.1. Stavanger - 21-22 August 2019

- Vegard Ankarstrand Parks and roads department
- Jenniffer Audrey Bamber Stavanger botanical garden
- Gabriele Brennhaugen Environmental department
- Imme Dirks Environmental department
- Jo Faugli Planning department
- Daniela Fuchs Bergknapp
- Jarle Furre Water and sanitation department
- Åge Gjesdahl Storm Aqua
- Hans Martin Hanslin NIBIO
- Felicitas Heimann Planning department
- Bjørn Zimmer Jacobsen Water and sanitary department
- Hugo Kind Urban and societal planning
- Silje Kjosavik Asplan Viak
- Lars Kolnes Bergknapp
- Signe Stahl Kvandal Water and sanitation department
- Ole Martin Lund Planning department
- Aina Hovden Lunde Parks and roads department
- Eli Nessa Urban Sjøfront
- Mari L. Norheim Urban planning department
- Ingerid Pegg Water and sanitary department
- Claus Sigurd Petersen Parks and roads department
- Amalie Rage Asplan Viak
- Jack Ravnsbæk Parks and roads department
- Harald Sævareid Stavanger Smart City
- Anne Merethe Skogland Landscape architect, Rambøll
- Torgeir Esig Sørensen Parks and roads department
- Angjerd Sunnanå Parks and roads department

- Ellen Figved Thoresen Planning department
- Hilde Uberg Parks and roads department
- Elin Vagle Stavanger Eiendom

Facilitated by:

- Elke den Ouden TU/e LightHouse
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- Sophie Mok Fraunhofer IAO
- Rianne Valkenburg TU/e LightHouse

#### 6.2.2. Castellón - 25-26 September 2019

- Begoña Antequera Hort del Manyano
- Juan Antonio Espaitec
- Daniel Garcia Bernal Municipality of Castellón
- Manuel Bonillo Electronobo
- Santiago Bretón INDES / UBE
- Enrique Cabanes DeIngenieros
- Pablo Carratala Cátedra FACSA de Innovación en el Ciclo Integral del Agua
- Celia Casagrande BP
- Sergio Chiva Cátedra FACSA de Innovación en el Ciclo Integral del Agua
- Javier Climent Facsa
- Alejandro Colonques Espaitec
- Jose Alberto Fortanet UBE
- José Luís Fullea UBE
- Margarita Fúnez Nippon Gases España
- Luís Gargori Municipality of Castellón
- Pilar González UBE
- Susanna Gordo Colegio Oficial de Ingenieros Técnicos Agrícolas de Valencia y Castellón
- José Luís Herráez Nippon Gases
- Jose Luis Larabuig Municipality of Castellón
- Consuelo Leal Municipality of Castellón
- Aina Macías Cátedra FACSA de Innovación en el Ciclo Integral del Agua
- Javier Manzanero gmg arquitectos
- Esperanza Melendez Hort del Manyano
- Blanca Pedrola Bipolarie

- Tere Pilan Colegio Oficial de Ingenieros Técnicos Agrícolas de Valencia y Castellón
- Sara Llorens Piñana Municipality of Castellón
- Mónica Rober BP
- Juan Carlos Sanchis Municipality of Castellón
- Sara Sanchis Becsa
- Luisa Cervero Tatay Municipality of Castellón

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- Sophie Mok Fraunhofer IAO
- Marielisa Padilla Fraunhofer IAO
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#### 6.2.3. Prague - 9-10 October 2019

- Eva Ešnerova IPR Praha
- Iva Herčíková MČ Praha 3
- Tomáš Hrdinka MČ Praha 4
- Jitka Jeřábková IPR Praha
- Rozalie Kašparová IPR Praha
- Jana Kožnarová Kokoza
- Jakub Klimeš IPR Praha
- Michal Křivohlávek BIENO
- Vendula Mensiková facilitator
- Adam Pajgrt IPR Praha
- Jindřich Pinc facilitator
- Petr Lukáš Racek owner
- Jan Richtr IPR Prague
- Nikola Rusová MČ Praha 3
- Ondřej Růžička MČ Praha 4
- Martin Špičák IPR Praha
- Štěpán Špoula IPR Prague
- Barbora Týcová BIENO
- Monika Uhlenbruch IPR Prague
- Matěj Michalk Žaloudek MČ Praha 3

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- Sophie Mok Fraunhofer IAO

**6.2.4. Başakşehir - 14-15 November 2019**

- Toncay Akj Başakşehir Municipality
- Ycsnib Aktas Başakşehir Municipality
- Emre Aydın Başakşehir Municipality
- Melika Enda Balcı Başakşehir Municipality
- Kerim Derimbaz Başakşehir Municipality
- Erkan Eroğlu Başakşehir Municipality
- Karim Gülem Park Bahceler
- Muhittin Gülkan Başakşehir Municipality
- Ömer Karabayraktar Bilgi İşlem
- Gökhan Karatas Tügva
- Asman Cemtu Kügükaidin Başakşehir Municipality
- Ahmet Melik Başkan Yar d.
- Ömer Onur Başakşehir Living Lab
- Sinan Özkorkmaz İstanbul Organized Industry District
- Ibrahim Öztekin Başakşehir Municipality
- Bekir Selak Temel Bilgi İşlem Md
- M. Furka Timaslan Mal Hiz. Md.
- Can Tunçsav Başakşehir Living Lab
- Musa Yazici Tügva Başakşehir

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- Shahryar Ershad Sarabi TU/e
- Ernesta Maciulyte University of Stuttgart IAT
- Rianne Valkenburg TU/e LightHouse

**6.2.5. Cannes - 5-6 December 2019**

- Benoît Agassant Ville de Cannes (Direction Hygiène Santé Environnement)
- Luc Aribaud Conseil Scientifique des Iles de Lérins
- Jerome Briot Building Department
- Valérie Capon Urban Planning
- Philippe Carassou Maillan Communauté d'Agglomération Cannes Pays de Lérins
- Richard Colson Finance Department
- Yannick Ferrand Risks Department
- Nicolas Gorjux Deputy Mayor Finance
- Romain Grillot Building Department
- Sophie Jimenez Communauté d'Agglomération

Cannes Pays de Lérins

- Magalie Thabuis Ville de Cannes (International Relations Office)
- Claude Leininger Green Spaces
- Arnaud Leprêtre Building Department
- Boris Martello Communauté d'Agglomération Cannes Pays de Lérins
- Sonia Neel Logistic Department
- Thomas Onzon Ville de Cannes (Directeur Général des Services Techniques)
- Marie Pourreyron Ville de Cannes (Deputy Mayor Environment)
- Frédéric Poydenot Centre Permanent d'initiatives pour l'Environnement Iles de Lérins et Pays d'Azur
- Lea Quarta Sea Department
- Claire-Anne Reix Ville de Cannes (Deputy Mayor Risk)
- Philippe Ribollet Urban Planning
- Florence Richard Urban Planning
- Virginie Salichon Communauté d'Agglomération Cannes Pays de Lérins (Environment Department)
- Marie Tatibouet Communauté d'Agglomération Cannes Pays de Lérins (Water Department)
- Pascal Teisseire Road Department
- Karin Topin Condomitti General Director
- Pascale Vaillant Deputy Mayor Education

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- Shahryar Ershad Sarabi TU/e
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