Funded by
the European Union

Ref. Ares(2023)7006911 - 16/10/2023

WP1 Verification of User Requirements & Co-creation Processes and Crowd Science

Deliverable D1.1: Report on User requirements for adopting satellite data supported in planning, budgeting, and investment decisions.

Authors: Rasmus Reeh [URD], Antonia Shalamanova and Desislava Todorova [SDA], Nina Costa [NDConsult]

Disclaimer

Grant Agreement No. **101082551**	Acronym **100KTREEs**		
Full Title	Decision toolbox for cities to improve air quality, biodiversity, human wellbeing and reduce climate risks by planting more trees.		
Topic	**EUSPA-HE-2021-SPACE-02-05** EGNSS and Copernicus for applications fostering the European Green Deal		
Funding scheme	Horizon: EUSPA-2021-SPACE		
Start Date	December 1st, 2022		
Duration	36 months		
Project URL	https://www.100ktrees.eu/		
Project Coordinator	DHI		
Deliverable	Deliverable D1.1: Report on User requirements for adopting satellite data supported in planning, budgeting and investment decisions.		
Work Package	WP1 Verification of User Requirements & Co-creation Processes and Crowd Science		
	M8	Version	Final
Actual Delivery Date	31 July 2023		
Nature		Dissemination Level: PUBLIC	
Lead Beneficiary	Urban Digital		
Authors	Rasmus Reeh [URD], Antonia Shalamanova and Desislava Todorova [SDA] and Nina Costa [NDConsult]		
Quality Reviewer(s):	Birgitte Holt, CWare, Gerd Dahl CWare		
Keywords	Stakeholders, User stories, Survey, Co-creation, User Requirements		

Funded by the European Union

Document history

Ver.	Date	Description	Author(s) name
0.1	May 31	ToC	Rasmus Reeh [URD], Antonia Shalamanova and Desislava Todorova [SDA] and Nina Costa [NDConsult]
0.2	June 15	First draft	Rasmus Reeh [URD], Antonia Shalamanova and Desislava Todorova [SDA] and Nina Costa [NDConsult]
0.3	July 7	Critical review	Rasmus Reeh, URD
0.4	July 10	Minor changes	Nina Costa
0.5	July 11	Minor changes	Birgitte Holt Andersen, Gerd Juul
1.0	31 July 2023	Final version	Rasmus Reeh, URD
1.1	1 sept 2023	Reviewed version	Rasmus Reeh, URD

Funded by the European Union

Participants

No.	Participant Name	Short Name	Country Code	Logo
1	DHI (coordinator)	DHI	DK	
2	Sofia Development Association	SDA	BG	
3	Eurosense Belfotop	ES1	BE	
3.1	Eurosense GMBH	ES2	D	
4	EcoTree	ECO	FR	
5	Geographical Information Systems Int. Group	GSG	IT	
6	Vrije Universiteit Brussel/Bitagreen	VUB	BE	
7	OneTree Foundation (EdnoDarvo)	OTF	BG	
8	CWare (project lead)	CWR	DK	
9	UrbanDigital	URD	DK	
10	NDConsult Ltd (associated partner)	NDC	UK	

Funded by the European Union

Table of Contents

Funded by the European Union

Table of tables

List of Acronyms

CPH	Copenhagen
EC	European Commission
GA	General Assembly
GIS	Geographical Information System
MIM(s)	Minimum Interoperability Mechanism(s)
SOF	Sofia
UR	User Requirement
WP	Work Package

Funded by the European Union

Executive Summary

This deliverable report has been carried out with the aim to identify what our potential users need for their management of tree.

A multi-faceted methodology was used to gather valuable insights and identify user requirements for the 100KTrees toolbox. This involved conducting interviews, generating user stories, and administering surveys to professionals in the field. These inputs were analysed and used in workshops where participants engaged in collaborative activities and discussions guided by facilitators, allowing for the identification of key user requirements.

The key findings from the survey support the relevance of the 100KTrees project:

- 83% of respondents emphasized the importance of monitoring urban trees and having comprehensive tree information.
- Climate change adaptation and various environmental goals were rated as very important by 60-65% of organizations.
- Concerns about costs and risks related to urban trees were raised by 92% of respondents, with maintenance costs standing out.
- Tree attributes such as type, pollutant absorption, height, canopy density, and growth rate were identified as significant.
- The majority considered the financial value of environmental impacts, planting costs, and maintenance costs as important to very important.
- Priorities for the 100KTREEs services and toolbox include socio-economic modelling, impact on future climate scenarios, and tree planting scenarios.
- Key toolbox features include locating planting spaces, cost-benefit analysis, maintenance planning, and monitoring tree health.

A list of user requirements has been identified that will guide the development of the 100KTREEs software solution, ensuring it addresses stakeholder needs and aligns with the identified priorities.

To secure the context during the forward going process, three key use cases have been formulated during the engagement process:

1. Maintenance of Trees: Participants emphasized the need for optimizing the cost of tree maintenance by accessing foundational information about tree location, type, and size. They also sought the ability to schedule tasks for operational teams and understand which trees require less maintenance. Providing a choice of aesthetically suitable alternative trees was also requested.
2. Planning of Urban Green Infrastructure: City representatives highlighted the challenge of selecting and prioritizing locations for tree planting in green areas, including the socio-economic benefits. Integration of IPCC climate scenarios and risk assessment of urban heat islands is desired, along with cross-sector integration for aligning tree management and biodiversity policies.

Funded by
the European Union

3. Integration to Legal Reporting: Participants emphasized the importance of reporting to climate plans and complying with legal frameworks, such as the EU CSRD and Taxonomy directive. Reporting requirements vary, and there is a need for standardized accounting perspectives and reporting guidelines.

Addressing these use cases will enable the development of 100KTrees software solution that optimizes tree maintenance, facilitates efficient urban green infrastructure planning, and streamlines legal reporting processes.

Funded by
the European Union

1 Introduction

The purpose of this document is to provide an operational report to the technical teams of the 100KTrees project from the input given by potential users. Although the report is public the audience that will use the report is primarily internal.

Other users and beneficiaries of the work may include other specialists who seek information on the needs and requirements of urban planners and related professionals regarding trees in urban settings.

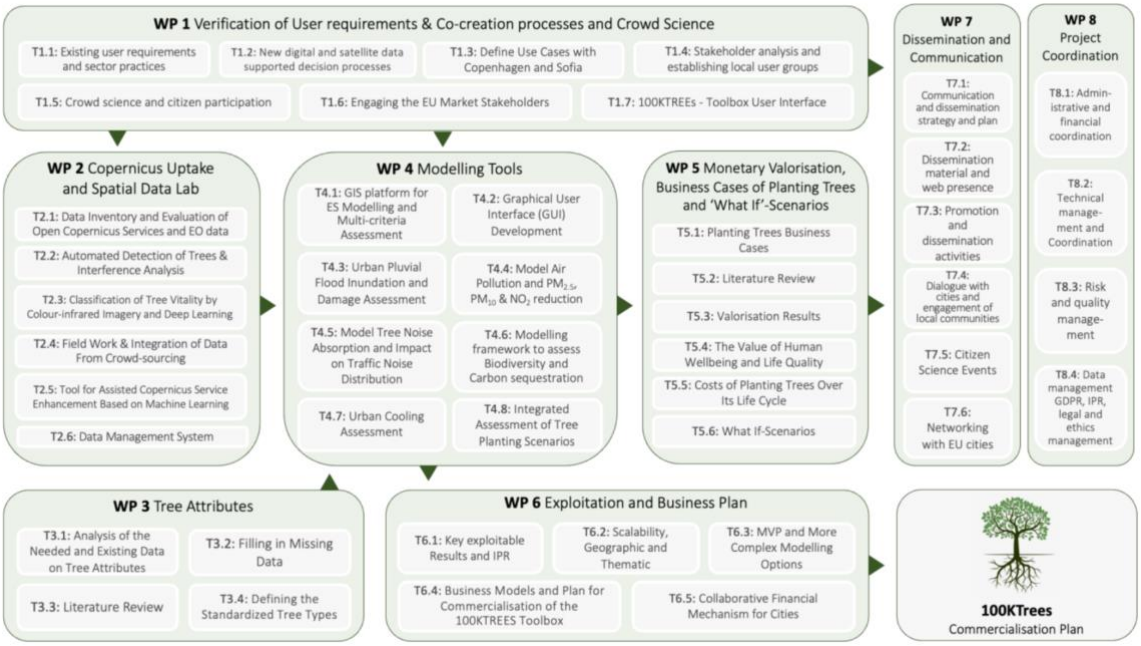
In this report, information collected from stakeholders and potential users of the toolbox that will be developed within the 100KTrees project is presented. Collected information from the different methods used was translated into user requirements for both pilot cities – Sofia and Copenhagen. As a next step this information will be further discussed and assessed by technical partners of the 100KTrees consortium to further plan project activities and developments.

1.1 Relation to other activities

D1.1 relates directly to Task1.1 and also T1.4. It provides an understanding of potential users' needs and is therefor relevant in the planning of how the 100KTrees Toolbox should be designed. In terms of relation to other tasks and work packages in the project, D1.1 is central to WP5 and 6 for the commercial aspects of the project and therefore also to guiding how modelling (WP4) is carried out and the data needed in order to enable the toolbox at a European scale.

In overview D1.1 and the 100KTrees workplansi:

Figure 1-1 Relation to other activities



1.2 Structure of the document

The structure of the document follows the methodological process. Chapter 2 explains the main actors and stakeholders and the initial engagement with these through user stories. Chapter 3 digs deeper with an analysis of the survey results. Chapter 4 combines the results of the stakeholder workshops into user requirements. Chapter c includes and provides next steps for the project.

Funded by the European Union

2 100KTREEs Stakeholders and User Stories

2.1 List of potential stakeholders

The team created a list of stakeholders since the start of the project that will be constantly updated throughout the 100KTrees project depending on the concrete needs and objectives set by the project consortium. Once the list of stakeholders was created, Sofia team started getting in touch with the identified stakeholders to initiate meetings and follow up discussions to collect user stories. A template for collecting user stories was created that was later filled up with concrete user stories that were collected during 1:1 meetings and conversation with the stakeholders that were identified. Focus was stakeholders of the municipalities as they are being expected to be the main beneficiaries of the 100KTrees project.

As a follow up on the collection of the user stories, WP1 partners co-created an online survey that was later distributed to the list of stakeholders aiming at collecting more insights on the needs of the cities in relation to the planting and maintenance of the green system. It turned out a bit difficult to ensure a high response rate on the questionnaire since it required respondents to fill it online and e-mail and phone reminders turned out not to be the most effective way to push for this. Efforts on gathering more responses to the questionnaire are still ongoing and will continue in the coming months as this will allow the project team to get additional information from various stakeholder groups.

Sofia City			
Organisation	**Role**	**Type**	**Local importance**
City officials and municipally owned companies:			
Municipality	Deputy Mayor	managing all environmental programs on municipal level	Main policy maker that we need on board for all kinds of environment-related policies. Governing all municipal policies related to sustainable environmental development.
Municipality	Director of Green Systems Directorate	managing the public green system of Sofia	The department responsible for managing the green system of Sofia Municipality located on municipally owned land/
Municipality	Chief Architect		
Sofiaplan	Acting Director	Sofiaplan is a municipal enterprise which is responsible for spatial and strategic planning of the Sofia Municipality.	
Municipal parks and gardens	Director	managing public parks and gardens of Sofia Municipality	
National Park Vitosha	Director	managing the national park on the territory of the municipality	

Funded by the European Union

Sofia City Council	Head of Commission / City Councillor	Commission on environment at Sofia City Council. Managing programme Green Sofia	
Private companies			
Colliers	Executive director	real estate	
Arhitectonika	Founder	architecture	
Place.make studio	Urban planner	urban planning and design	
Educational institutions			
University of forestry Sofia	Professor - Landscape architecture	education and research	
University of architecture, civil engineering and geodesy	Professor - Urbanism	urbanist	
Sofia University	Professor - Geography and GIS	geography	Performed the heat island effects analysis for Sofia Municipality
NGOs			
Bulgarian Association of Ornamental Plants Nurseries /BAOPN/	Chairman of the Managing Board	landscape architect	Owners and managers of the largest 25 companies producing decorative plants in Bulgaria
National Association of Municipalities in Bulgaria (NAMRB)	Managing Director		Representatives of almost all cities in Bulgaria, focused on environmental policies.

Table 2-1 100KTREEs Sofia stakeholders

Identified stakeholders by SDA's team were invited to fill in a short online survey before attending the co-creation workshop. The idea was to identify main triggers related to planning the tree planting and maintenance as well as assess better the needs of the stakeholders in terms of management of the green system in the city. The survey also provided input on the tree attributes that are most important for stakeholders that will be later used to help the development of the 100KTrees toolbox. Within the survey stakeholders were invited to answer questions related to the amount they will be willing to pay for the toolbox that will be later used by the 100KTrees project team to define its business model and strategy and sustainability plan.

Most of the survey respondents from Sofia have acknowledged that tree planting and maintenance is of extreme importance to them and is essential to perform their work activities. Main attributes that were presented in the survey were also acknowledged with an almost equal importance by all respondents. Impact the trees are having on environment was evaluated and main impacts were classified as follows:

- Improvement of air quality
- Community well-being
- Biodiversity preservation
- Cooling
- Noise absorption
- Flood prevention.

Funded by the European Union

Additionally, the survey provided an insight on the current state of the art regarding tree planting and maintenance in Sofia and helped the SDA team to prepare additional points for discussion and clarification during the planning phase of the stakeholder co-creation workshop.

Copenhagen

The stakeholders in Copenhagen include:

Municipalities

Copenhagen is divided into two municipalities - Municipality of Copenhagen and Municipality of Frederiksberg. Frederiksberg is an enclave and is surrounded by the Municipality of Copenhagen.

Traditionally, Frederiksberg is more conservative and have held an identity of being the 'green heart' of Copenhagen. The Bon mot reflects a dual distancing to Copenhagen, a political reflecting the colour of the Conservative Party and a planning difference, that prioritises trees, wider streets, and lower building utilisation of lot area.

The centre of Copenhagen is built around the harbour that traditionally have been home to economic activity of wharfs, trade, and administration. Three waves of urbanisation have created a dense city - first for accommodating a new working class, second after the WWII in the 1960s of student and social housing, and lately since the 1990s of more affluent segments. At the beginning of 1990s Copenhagen was at the brink of bankruptcy and an investment plan was devised to attract taxpaying professionals as a turn around. The climate plans of the city are direct tools to this end.

The difference in history is very much revealed in the current situation around trees. Frederiksberg has kept its old street trees on boulevards and maintained them as part of their urban identity, where as the density of most Copenhagen streets have little room for trees and often have, they been cut and replaced with smaller to make room for building activities.

On the organisational level the difference is reflected as well. In Frederiksberg, trees have been maintained inside the same office as urban life over time, whereas the urban life officers in Copenhagen have been shifted repeatedly between parts of the administration. Lately, and as part of the Climate plans, trees and greenery have been prioritised politically and a planning task force have been set up across offices of climate adaptation, urban life, and city data.

Other political and citizen groups

The political structure of Copenhagen includes 12 local councils at district level. Each is funded by the municipality and holds little overall planning competence. However, they are centre of local improvements and fund local projects. In recent years, there has been a local focus of bringing nature into the urban fabric. Often local resistance is mounting when old trees are cut, and the local councils have been in the middle of these reactions. Also, citizens' action against air and noise pollution are often formulated within local groups organised in the local council. UrbanDigital has interviewed one local council.

Large building owners

In Copenhagen, many of residential buildings were sold off as part of the investment plan and organised mainly into residents' amalgamations of shared ownership. This leaves much of the residential market fragmented. In the subsequent urbanisation, much of new builds are rental and owners can be divided

Funded by the European Union

into investors with short term ownerships, and pensions funds with long term commitments. The Copenhagen team has interviewed PensionDanmark during the project. Their tree policies currently reside in their biodiversity policy.

Social housing maintains a substantial proportion of the residential buildings. In Copenhagen, regulation inscribes 25 per cent to be social housing which is maintained in new brown field developments. Traditionally, positioned on the outskirts of Copenhagen and Frederiksberg, social housing is constructed as taller buildings in concrete, and often have green areas for leisure activities around. UrbanDigital conducted a workshop with the biodiversity, planning, and innovation departments of KAB, a large social housing association.

Copenhagen			
Organisation	**Role**	**Type**	**Local importance**
City officials and municipally owned companies:			
Municipality Frederiksberg	Lead, urban spaces and climate adaptation	Overseeing municipal implementations on urban heat, cloudburst management, and air pollution	Central Advisor to local policy and decision making for coordination of implementations of environment and urban spaces-related policies with a focus on socio-economic value creation.
Municipality Frederiksberg	Lead on GIS and digitalisation of municipal services	managing data and digital systems of Frederiksberg	The department responsible for data and digital decision support for policy making and city services.
Municipality, Copenhagen	Lead, section for climate adaptation	Overseeing planning and investments in cloudburst mitigation and climate a adaptation in Municipality of Copenhagen.	Climate adaptation is identified as main investment instrument to install a green and blue infrastructure in Copenhagen.
Municipality, Copenhagen	Innovation lead, climate adaptation.	Responsible for including new technology into city services	Same as above
Municipality, Copenhagen	Urban planner	Urban planning and design	Key urban planner for urban spaces and responsible for tree policy.
Municipality, Copenhagen	Team lead	managing GIS, data, and digital infrastructure in Technical and Environmental department	The department responsible for data and digital decision support for policy making and city services.
Municipality, Copenhagen	Park manager	Maintenance services	Responsible for maintenance of treen spaces in Copenhagen.
Local Council	Councillor of local council	Citizen involvement	Key responsible for understanding local citizens' sentiments.
Housing companies			
KAB	Urban planner	Social housing	Responsible for bringing biodiversity, trees and green areas to social housing organisations

Funded by the European Union

			within Greater Copenhagen area.
KAB	Urban planner	Social housing	Strategic planner for long term sustainability for social housing in Greater Copenhagen area.
Arup	Urban planner	urban planning and design	
Educational institutions			
University of Copenhagen	Ass. Professor	Public health	Scientific input on impact of trees to human health
NGOs			
Miljøpunkt Amager	Director	Citizen engagement	ngo working to address climate change

2.2 User Stories

In addition to a stakeholder survey (see next chapter), we also asked the participants to formulate user stories. A user story is a short, simple description of a feature told from the perspective of the person who desires a new capability, usually a user or customer of the system. It takes the form of:

As a <type of user>, **I want to** <perform a task> **so that I can** <achieve this goal>.

Unlike a questionnaire, it does not rely on presumptions (on the part of the team) regarding what the users would like, and it allows the user to make 'wishes' which are not constrained by current thinking and technical feasibility. This brainstorming without limits is useful for identifying 'blue sky' ideas. Consequently, not all the user stories will fall within the remit of the 100KTREEs project. However, user stories offer valuable ideas to be explored during the subsequent co-creation workshops. The user stories obtained for each of the user cities can be found in the tables below. These have been further elucidated into detailed user requirements during the series of 100KTREEs co-creation workshops that were held in April to June 2023.

The 100KTrees team started collecting user stories from the identified stakeholders from the beginning of the project to better understand their needs and build a strategy on how to conduct the co-creation workshop. Moreover, user stories collection was seen as a tool to build a solid relationship with the stakeholders and identify the current state of green system management in the city. User stories were collected during 1:1 meetings or phone conversations with the stakeholders willing to participate in the project and share their feedback. The template that was prepared has also been sent out via email to stakeholders with whom the team did not get the chance to initiate personal contact.

User stories collection helped the team to better understand the state of the art in the cities and identify problems and issues that might be resolved with the 100KTrees toolbox to be developed.

Below is a table representing the collected user stories by Sofia's team:

Sofia City		
As a... <type of user>	**I want to...** <perform a task>	**So that I can...** <achieve this goal>
Example: Facility Manager	*Example:* *Access all data in one place*	*Example:* *Spend less time on collecting data*

Funded by the European Union

As a policy maker	I want to limit the effect of heat islands	So that I can tackle climate change
As a city representative	I want to find a way to improve muddy spots	So that I can improve quality of life of the citizens
As a real estate broker	I want to have access to lands that are of high value to customers	So that I can maximize profits
As an investor	I want to limit the investment in compensatory landscaping	So that I can limit my expenses
As a landscape architect	I want to share my knowledge on local landscape and its features	So that I can educate society and raise awareness on environmental issues
As a chief architect	I want to ensure the implementation of the masterplan for green corridors	So that I can ensure flow of fresh air in the city
As a park manager	I want to examine the status of the lands I manage	So I can prevent accidents
As a landowner	I want to get benefits/ profit of my ownership	So I can ensure my living
As a city official	I want to achieve my goals on air quality and noise	So I can improve quality of life of citizens
As a park manager	I want to know where to plant new trees	So I can manage better the park I am responsible for
As a city official	I want to know who is responsible for the green system management in every part of the city (zoning)	So I can be able to navigate people willing to donate trees/plants for planting
As a city administrator	I want to have access to repository of trees on the territory of the city	So I can be able to better manage green system of the city
As a park manager	I want to know which trees in my park need maintenance	So I can plan accordingly my maintenance activities
As a city administrator	I want to know which trees are good for planting in my city	So I can advice people willing to donate or plant new trees on what and where to plant
As a city official	I want to have an option to add spots on already existing trees/plants on the city's territory (currently a register of the trees in the city is available but has only 560-600 000 points and more are existing)	So I can have a full register of all the trees in the city

Funded by the European Union

As a city official	I want to be able to create a map of available spots for planting new trees	So I can plan accordingly planting activities
As a city official	I want to be able to monitor over time how a place changes/develops after planting trees	So I can do some environmental screening of the microclimate and how behaviour of the people changes
As a city official	I want to be able to easily teach new people on how to manage green system	So I can optimise human resources
As a city official	I want to be able to monitor or validate (e.g. using satellite pictures) changes in the environmental status over time	So I can prepare analysis on how tree planting affects the environmental indicators in certain areas of the city

Table 2-2 User storiesSofia

Below are the user stories collected in Copenhagen:

Copenhagen		
As a park manager	I want to know which trees in my park need maintenance	So I can plan accordingly my maintenance activities
As a city administrator	I want to know which trees are good for planting in my city	So I can advice people willing to donate or plant new trees on what and where to plant
As a city official	I want to have an understanding of how natural resources can be used in the maintenance of the city.	So I can coordinate the planning of nature based solutions as a whole.
As a city official	I want to be able to create a map of available spots for planting new trees	So I can plan a green infrastructure in the city
As a city official	I want to be able to project changes in temperature in the city according to IPCC scenarios.	So I can do risk assessments and identify areas where temperature will be problematic.
As a city official	I want to be able to easily monitor and calculate the CO2 sequestering of trees in the city	So I can provide input to the climate plan of the city.
As a city official	I want to be able to monitor or validate (e.g. using satellite pictures) changes in the environmental status over time	So I can prepare analysis on how tree planting affects the environmental indicators in certain areas of the city
As a city official	I want to understand what formation of tree planting is the most effective in terms of air pollution and cooling effect.	So I can assess whether street trees or pocket parks are most effective in terms of resources.
As a city official	I want to be able to analyse socioeconomic outcome of trees	So I can provide sound background to political processes

Funded by the European Union

As a city official	I want to be able to understand the impact of trees together with cloudburst adaptation plans	So I can combine and coordinate investment planning, and implementation
As a city official	I am interested in the impact of trees over different seasons	So I can foresee political objection
As a city official	I want to understand which types of trees that will serve as alternatives with same aesthetics as existing trees	So I can advise politicians, who have preferences to specific tree types, to choose trees that are likely to be able to live in future conditions.
As a city official	I want to be able to provide alternatives in the event of conditions disfavoring tree planting	So I can deliver alternatives to street trees in the neighborhoods where underground infrastructure conditions inhibit the planing of trees
As a city official	I want to know where trees are on privately held property.	So I can analyze all trees impact on cloudburst adaptation plans (not just the municipality owned)
As a city official	I want to know which private land and gardens are suitable for planting trees	So I can do partnerships with private landowners in order to fulfil the tree policy of the city
As an investor	I have a general interest to learn and understand how trees and greenery can influence the living conditions in the areas of buildings of my portfolio	So I can assess future value of buildings and as asset and risk management.
As an investor	I want to be able to monitor my CO2 emissions, biodiversity improvements, etc.	So I can report them to my clients and to my ESG and CSRD reporting.
As a social housing administrator	I want to be able to provide a factual reasoning for replacing existing trees when these die from age	So I can provide factional advice to our member organizations
As a social housing administrator	I want to be understand which kind of trees are optimal to plant in terms of biodiversity	So I can inject trees in to plans for creating biodiversity at our member organizations with least economic burdens
As a social housing administrator	I want to be able to identify where and how many trees we have at our properties.	So I can optimise the maintenance planning of our gardening efforts.
As a social housing administrator	I want to be able to monitor the impact of trees on to our CO2 accounting	So I can provide input to our reporting of the CSRD/Taxonomy
As a social housing administrator	I want to be able to see city plans for green infrastructure	So I can learn how our organisation can optimise our own effort, assist city plans, and opt for funding for tree planting.
As a social housing administrator	I want to understand how greenery and trees can provide quality of life improvements	So I can advice our most ambitious organizations on how to provide the best housing conditions to budget.

Table 2-2 User stories Copenhagen

Funded by the European Union

2.3 Overview of user stories

The collection of user stories can be distilled into a number of themes which supported the agenda setting for the workshops.

A first theme is a general or foundational overview of trees within a geographical area. The interest is not restricted to providing overview of how many trees the organisation owns but includes trees on private lands. The theme includes an interest in the kind of trees which again connects to maintenance and biodiversity.

The user stories also reveal a need for monitoring as part of a workflow. This is reflected by the need to calculate CO2 emissions and enable direct transfer into CSRD reporting and municipal climate plans.

A third theme is the planning and includes short time perspective and longer-term perspective to expected future conditions. For the shorter time perspective, there is an interest in understanding how to plan for trees inside existing conditions and plans, e.g., cloudburst policies and newly introduced biodiversity ambitions. For the longer term the view is to be able to identify where green corridors and infrastructure can provide optimal effect in the light of expected temperature rises. This theme also includes the view that trees are to be looked at in a broader perspective of greening not just trees, in order to install green infrastructure that provide shade and fresh air inside the most affected areas of the city.

Fourthly, the user stories identify a focus on trees as a provider of utility. Most evident in Copenhagen but included in Sofia as well, trees are seen to provide quality of life and socioeconomic benefit. The ability to provide quantified and qualified reasoning based on data and science as the foundation for policy formulation and subsequent implementation towards citizens is well sought for.

Funded by
the European Union

3 Stakeholder Survey

3.1 Purpose of the questionnaire

The team devised a stakeholder questionnaire – see Annex 4 for the English version in pdf format.

The aim of this questionnaire was to gather information about the stakeholders in advance of the co-creation workshops. To find out more about them, their jobs within the organisation and why they/their organizations are interested in in urban nature-based solutions. What information on they need, what environmental aspects are important to their organizations, as well as the 'pains' and 'gains' that they experience regularly in their jobs. Thus, this questionnaire represents the first step in gaining an insight into the priorities that the team should set when developing the 100KTREEs toolbox for our clients. This questionnaire was also translated into Danish and Bulgarian.

All three can be found at the following links:

English version: https://ec.europa.eu/eusurvey/runner/100KTREEs

Danish version: https://ec.europa.eu/eusurvey/runner/100KTREEs?surveylanguage=DA

Bulgarian version: https://ec.europa.eu/eusurvey/runner/100KTREEs?surveylanguage=BG

The questionnaire was devised using EU Survey software and was kept deliberately short (taking 5-7 minutes to complete) to maximize the number of responses. For ease of use, we divided it up into four sections:

1. You and your organization
2. Information that will help us better understand your organization
3. Information about your job related to tree planting in the city
4. Future toolbox/decision support system
5. Anything else to add

The questionnaire includes mainly multiple choice and with some open-ended questions for additional clarifications. It includes a statement that the responses will be anonymized and only be used for research purposes, as well as a confirmation of GDPR conformity. A final question asked them if they want to receive our newsletter and to be kept up to date on the project progress – this was the only point at which they could submit their contact details if they so wished.

In a first step, we asked potential users from Copenhagen and Sofia to complete this questionnaire.

The next step is to open the questionnaire up to all cities and parties that are interested in the planting and maintenance of urban trees. It will be widely promoted to other cities authorities and city organizations through WP 7 activities. In this way, additional responses, beyond those from Copenhagen and Sofia, will allow us to gather information on potential new clients and will prove useful for future exploitation of the 100KTREEs toolbox & geographical and thematic market expansion.

3.2 Responses

We only received a limited number of responses in this first phase of the work – 5 responses from Danish stakeholders (42%), and 7 responses from Bulgaria (58%), giving a total of 12. Even if these numbers are low, we are confident that they represent the key stakeholders that were interviewed, and who

Funded by the European Union

subsequently participated in the co-creation workshops, and therefore are confident that their responses carry sufficient weight.

3.2.1 Section 1: You and your organisation

The breakdown of the type of respondents' organizations is shown below, and 33% were representatives of the municipalities, while on 17% were from the city authorities and 8% were urban planners. The remaining 42% (in the 'other' category), are from a Danish housing association, a Bulgarian non-profit association, a PhD student/consultant, from the Vitosha Nature Park Directorate and a representative of the Union of Urban Planner in Bulgaria.

1.4 Does your organisation fit into one of these categories?

		Answers	Ratio
City Authority		2	16.67%
Municipality		4	33.33%
Urban planning consultant		1	8.33%
Private sponsor		0	0%
Real estate developer		0	0%
I don't know		0	0%
Other		5	41.67%

3.2.2 Section 2: Information that will help us better understand your organization

In response to question 2.1 Which of these environmental goals are important for your organisation and how would you rate their importance? From not important (1/5) to very important (5/5)', the following responses were given for each of these environmental goals:

1. Carbon neutrality

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		1	8.33%
4/5		4	33.33%
5/5		7	58.33%

2. Nature-based solutions

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		1	8.33%
4/5		3	25%
5/5		8	66.67%

3. Climate change mitigation

Funded by the European Union

		Answers	Ratio
1/5		0	0%
2/5		1	8.33%
3/5		0	0%
4/5		3	25%
5/5		8	66.67%

4. Climate change adaptation

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		1	8.33%
4/5		2	16.67%
5/5		9	75%

5. Social value of green areas and well-being

		Answers	Ratio
1/5		0	0%
2/5		1	8.33%
3/5		3	25%
4/5		1	8.33%
5/5		7	58.33%

Between 60 % and 65% of all respondents rated these goals as very important, while climate change adaptation received the highest response rate of 75% saying this was very important to their organizations.

Two respondents gave low importance to climate change mitigation and the social value of green areas, but the rest rated all these goals as important (3/5) to very important (5/5). It is reassuring that most stakeholder respondents put similar weighting on these environmental goals.

When asked why their organisation is interested in the 100KTRREs project, the responses were very varied and included the following:

- Biodiversity (2 responses)
- Urban landscape architecture
- Heat islands (2 responses)
- Nature-based solutions (2 responses)
- Tree policy
- European Green Cities project
- Ecosystem research

Funded by the European Union

- Urban environment (2 responses)
- Tree species & density monitoring
- City management.

These responses are further elaborated when asked why their organisation is interested in planting trees and other greenery.

- To replace old trees that have reached their natural age
- Policies for green/blue urban infrastructure
- Municipality vision for everyone to see at least one tree from their window
- CO2 neutrality and improved city life
- Heat island mitigation
- Healthier urban environment
- Inexpensive solutions to biodiversity and climate change challenges
- Biodiversity in cities
- ESG company strategy
- Urban planning to balance infrastructure and greenery
- Maintenance of green areas/parks and gardens [i] – 2 responses

To question 2.3 'Is your organisation concerned about the costs or risks of more urban trees and greenery?', 11 responses were affirmative (92%) while only 1 replied that this was not applicable. This overwhelming 'yes' response is somewhat surprising.

To explain why, the answers to question 2.4 highlights the risks and costs that are concerns on part of the respondents. While 'maintenance costs' stand out as the largest concern (albeit based on only 3 responses), many respondents gave a 'not applicable' response. This is hard to interpret, except that it could reflect uncertainties regarding the costs and risks.

2.4 If your organisation does NOT want to plant trees or greenery, do you know the reason why?

		Answers	Ratio
Risk of falling branches or trees		1	8.33%
Planting costs		1	8.33%
Maintenance costs		3	25%
Damage to existing assets/infrastructure		1	8.33%
Other unwanted effects		1	8.33%
Not applicable		8	66.67%

2.5 Does your organisation value trees and greenery (from an environmental and citizen health / wellbeing perspective) or do they view trees and greenery as a cost only?

Funded by the European Union

		Answers	Ratio
I don't know		0	0%
Cost only		2	16.67%
Trees have some value		4	33.33%
Trees are highly valued		8	66.67%
Not applicable		0	0%

It can be seen from the table above, that 12 responses valued trees or highly valued trees, while only 2 saw them as a cost only. Note that multiple responses were allowed here, hence the more than 100 % responses are reported in the table.

In response to question 2.6 'What costs or risks are most important to your organization? From not important (1/5) to very important (5/5)', the following responses were given:

1. Planting costs

		Answers	Ratio
1/5		1	8.33%
2/5		2	16.67%
3/5		2	16.67%
4/5		5	41.67%
5/5		2	16.67%

2. Maintenance costs

		Answers	Ratio
1/5		1	8.33%
2/5		1	8.33%
3/5		1	8.33%
4/5		6	50%
5/5		3	25%

3. Damage to infrastructure

		Answers	Ratio
1/5		0	0%
2/5		1	8.33%
3/5		7	58.33%
4/5		1	8.33%
5/5		3	25%

4. Security risks linked to big trees

		Answers	Ratio
1/5		1	8.33%
2/5		2	16.67%
3/5		4	33.33%

Funded by the European Union

		Answers	Ratio
4/5		3	25%
5/5		2	16.67%

From these responses it can be seen that the majority (59%) view planting costs as fairly (4/5) to very important (5/5), and 75% rate maintenance costs as fairly (4/5) to very important (5/5). Damage to infrastructure was less important in most responses, while the security risk of big trees was spread out between slightly important (2/5) to fairly important (4/5).

It was very reassuring for the team to see the importance of having information and data on the location and impact of new trees – see question 2.7 below – with 75% responding that this was fairly (4/5) to very important (5/5).

2.7 How important is it for your organisation to have information and data on the location and impact of trees to justify the planting of new trees?: Not important (1/5) / Very important (5/5)

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		3	25%
4/5		4	33.33%
5/5		5	41.67%

Over 90% of respondents were interested or possibly interested in seeking third-party (corporate) sponsorship to cover of costs of planting new trees.

3.2.3 Section 3: Information about your job related to tree planting in the city

Regarding their access to information on trees and green areas, or potential areas, the responses to questions 3.1, 3.2 and 3.3 can be seen here:

3.1 Do you have access to a map of the trees and green areas in your city?

		Answers	Ratio
Yes		8	66.67%
No		3	25%
Not applicable		1	8.33%

3.2 Do you know where in the city there are potential areas to plant additional trees?

Funded by the European Union

		Answers	Ratio
Yes		7	58.33%
No		4	33.33%
Not applicable		1	8.33%

3.3 Do you know of parks or brownfield sites where many new trees could be planted?

		Answers	Ratio
Yes		9	75%
No		0	0%
Not applicable		3	25%

Around 58% to 75% already have access to this type of information, which is an interesting statistic to note for the project team. It implies that giving the stakeholders just a map of the city with this basic information will not be sufficient, as they have this already. The answers to the next set of questions on tree attributes focusses on the information that they might be missing.

1. Tree type (evergreen vs deciduous)

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		2	16.67%
4/5		4	33.33%
5/5		6	50%

2. Capability to absorb pollutants

		Answers	Ratio
1/5		0	0%
2/5		1	8.33%
3/5		3	25%
4/5		2	16.67%
5/5		6	50%

3. Tree height/maturity

		Answers	Ratio
1/5		0	0%
2/5		1	8.33%
3/5		4	33.33%
4/5		3	25%
5/5		4	33.33%

4. Canopy density

Funded by the European Union

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		3	25%
4/5		5	41.67%
5/5		4	33.33%

5. Growth rate

		Answers	Ratio
1/5		0	0%
2/5		1	8.33%
3/5		4	33.33%
4/5		4	33.33%
5/5		3	25%

6. Maintenance

		Answers	Ratio
1/5		2	16.67%
2/5		1	8.33%
3/5		4	33.33%
4/5		1	8.33%
5/5		4	33.33%

7. Root size

		Answers	Ratio
1/5		0	0%
2/5		1	8.33%
3/5		6	50%
4/5		1	8.33%
5/5		4	33.33%

From these responses the most important tree attributes are:

tree type and ability to absorb pollutants, followed by tree height, canopy density and growth rate. The responses to maintenance and root size are rather varied with a split between important (3/5) and very important (5/5).

In response to question 3.5 'For you how important are the different impacts of newly planted trees?', the answers are presented here:

1. Improved air quality

Funded by the European Union

		Answers	Ratio
1/5		0	0%
2/5		3	25%
3/5		1	8.33%
4/5		1	8.33%
5/5		7	58.33%

2. Carbon capture

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		1	8.33%
4/5		5	41.67%
5/5		6	50%

3. Improved biodiversity

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		1	8.33%
4/5		4	33.33%
5/5		7	58.33%

4. Flood avoidance

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		1	8.33%
4/5		5	41.67%
5/5		6	50%

5. Cooling

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		3	25%
4/5		2	16.67%
5/5		7	58.33%

6. Noise absorption

		Answers	Ratio
1/5		0	0%

Funded by the European Union

2/5		1	8.33%
3/5		5	41.67%
4/5		1	8.33%
5/5		5	41.67%

7. Community well-being

		Answers	Ratio
1/5		0	0%
2/5		2	16.67%
3/5		2	16.67%
4/5		0	0%
5/5		8	66.67%

The answers to these 7 impacts are once again most reassuring for the project team in that it would seem we have correctly identified the most important impact of trees for our stakeholders. Most responses were in the fairly important (4/5) to very important (5/5) categories, and the vast majority responded important (3/5) and above. Interestingly, community well-being (psychological, calming impact of green environment) was rated very important by the highest number of respondents.

8. Surrounding real estate value

		Answers	Ratio
1/5		1	8.33%
2/5		4	33.33%
3/5		1	8.33%
4/5		2	16.67%
5/5		4	33.33%

9. Unwanted/negative impacts

		Answers	Ratio
1/5		2	16.67%
2/5		1	8.33%
3/5		2	16.67%
4/5		3	25%
5/5		4	33.33%

It is not surprising that the value of real estate was not considered that important, considering only one real estate developer (Colliers Bulgaria) completed this questionnaire.

Regarding the unwanted or negative impacts, the responses differ widely. Unfortunately, we did not ask for clarification of what these might be, and so we are none the wiser in this respect.

Concerning the cost of planting new trees, only 1 respondent answered that it was not important (1/5),

Funded by the European Union

while 11 responded important (3/5) to very important (5/5). Knowing the cost of maintenance had the same response breakdown. (These were covered by questions 3.6 and 3.7). In contrast all respondents thought that it was important to very important to know the financial value of the environmental impacts of new trees for their jobs, with over 66% rating it very important.

3.8 How important is it for you to know the financial value of the environmental impacts of new trees for your job?: Not important / Very important

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		3	25%
4/5		1	8.33%
5/5		8	66.67%

It is important that the project team takes note of this statistic, as it impresses the important of the work that will be undertaken in WP5 (Monetary valorization, business cases of planting trees and what-if scenarios).

Regarding the importance of monitoring trees, these responses to questions 3.9, 3.10 and 3.11 are interesting.

3.9 How important is the monitoring of the trees for your job?: Not important / Very important

		Answers	Ratio
1/5		1	8.33%
2/5		1	8.33%
3/5		3	25%
4/5		3	25%
5/5		4	33.33%

3.10 What information do you require on the trees?

		Answers	Ratio
Tree position		8	66.67%
Tree health		7	58.33%
Tree species		9	75%
Tree size		9	75%
Other		6	50%

3.11 How often do you (on average) monitor your trees?

		Answers	Ratio

Funded by the European Union

Annually		4	33.33%
Every 2 years		1	8.33%
Every 5 years		0	0%
Other		7	58.33%

83% of respondents replied that monitoring of the urban trees is important to very important, with all information on trees (position, health, species, size) rated as almost equally important. The 'other' responses to question 3.10 on the tree information required included:

- Ability to create biodiversity
- What much water does trees absorb
- Ability of tree crowns to trap air pollution
- Difference between young and old trees
- Impact of small parks vs roadside trees
- Tree ecosystem services
- Record of last tree maintenance

Here we can see evidence of confusion in the terminology used. Most answers relate to tree impacts rather than tree attributes. However, these responses do reinforce the user requirement for the tree impacts analysis.

The majority want to monitor trees annually or on an 'other' timescale, the latter includes responses like; more often, constantly, daily, differently depending on the location of the trees, and a couple of 'don't know's.

When ask about the usefulness of citizen science (CS), 7 respondents saw such information provided by volunteers and or citizens) as helpful for tree management / monitoring, while 4 did not and 1 chose not to answer. CS was seen as a good way to minimise costs, identification of new or damaged trees, verification of EO data, for education & community involvement purposes, raising awareness of the positive benefits of trees, making tree information more easily available, and making the city authorities aware of trees that could be a danger.

3.2.4 Section 4: Future toolbox/decision support system

This section covers the features and services that the team envisaged for the 100KTREEs toolbox.

The question: **4.1 What information on urban trees would you like to have for your job?** The following responses reveal the information that they already have or would like to have:

1. Location and visualization of existing trees

		Answers	**Ratio**
We already have this information		6	50%
We don't have this information, but we need it		6	50%

Funded by the European Union

We don't have this information and we don't really need it		0	0%

2. Location of possible spaces for new trees

		Answers	Ratio
We already have this information		4	33.33%
We don't have this information, but we need it		7	58.33%
We don't have this information and we don't really need it		1	8.33%

3. Socio-economic modelling and valuation of the impact of the trees/planted areas (including the extent of carbon offset)

		Answers	Ratio
We already have this information		0	0%
We don't have this information, but we need it		12	100%
We don't have this information and we don't really need it		0	0%

4. Create tree planting scenarios with planting costs and socio-economic valuation

		Answers	Ratio
We already have this information		0	0%
We don't have this information, but we need it		10	83.33%
We don't have this information and we don't really need it		2	16.67%

5. Monitoring of the state of the trees, e.g.tree size, health, etc.

		Answers	Ratio
We already have this information		3	25%
We don't have this information, but we need it		8	66.67%
We don't have this information and we don't really need it		1	8.33%

6. Tree maintenance planning / alerts

		Answers	Ratio
We already have this information		4	33.33%
We don't have this information, but we need it		6	50%

Funded by the European Union

We don't have this information and we don't really need it		2	16.67%

7. Impact of trees and greenery on 20-30 year scenarios of expected change in temperature

		Answers	Ratio
We already have this information		0	0%
We don't have this information but we need it		11	91.67%
We don't have this information and we don't really need it		1	8.33%

8. Impact of trees and greenery on 20-30 year scenarios of expected change in precipitation

		Answers	Ratio
We already have this information		0	0%
We don't have this information, but we need it		11	91.67%
We don't have this information and we don't really need it		1	8.33%

9. Return-on-investment (ROI) scenarios for cities

		Answers	Ratio
We already have this information		1	8.33%
We don't have this information, but we need it		8	66.67%
We don't have this information and we don't really need it		3	25%

10. ROI for real estate investments

		Answers	Ratio
We already have this information		0	0%
We don't have this information, but we need it		9	75%
We don't have this information and we don't really need it		3	25%

11. Third party sponsorship options

		Answers	Ratio
We already have this information		0	0%
We don't have this information, but we need it		8	66.67%
We don't have this information and we don't really need it		4	33.33%

Funded by the European Union

12. Other

		Answers	Ratio
We already have this information		0	0%
We don't have this information, but we need it		7	58.33%
We don't have this information and we don't really need it		5	41.67%

It would seem that 'Socio-economic modelling and valuation of the impact of the trees/planted areas (including the extent of carbon offset)' is the most popular request with 12 responses, while 'Impact of trees and greenery on 20–30-year scenarios of expected change in temperature' and 'Impact of trees and greenery on 20–30-year scenarios of expected change in precipitation' are next with 11 requests each. The 'Create tree planting scenarios with planting costs and socio-economic valuation' had 10 requests.

The responses to questions 4.1.1 and 4.1.2 are at odds with the responses received on questions 3.1, 3.2 and 3.3. The latter implies that the interviewees had a higher level (60-67%) of access to this basic information (location and visualization of trees, location of possible new spaces for trees), while here they reported a 50-60% level. However, his discrepancy is not large and therefore might not be significant.

The monitoring of trees and tree maintenance planning/alerts were request by 67% and 50 % of respondents respectively. 8 out of 12 expressed on interest for the Return on Investment (ROI) scenarios for cities, with slightly less (9) interested in ROI for real estate investment. This is an interesting result considering that no real estate developers answered the questionnaire at this stage. 67% of respondents were also interested in third party sponsorship information.

60% specified 'Other', and these were clarified as:

- Mixing trees with other nature to increase biodiversity
- Water absorption by trees (2 responses) and how it changes with age
- Information on the location (of trees) that will give most 'value', to justify the interventions
- Importance for urban living
- Percentage/Number increase in new trees planted each year
- Which organisation is responsible for the green districts within the city.

Regarding the features the users would like to see offered by the 100KTREEs toolbox, we received the following responses (Question 4.2):

1. Location and visualization of existing trees/planted areas

		Answers	Ratio
1/5		0	0%

Funded by the European Union

2/5		0	0%
3/5		4	33.33%
4/5		4	33.33%
5/5		4	33.33%

2. Location of possible spaces for new trees/planted areas

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		2	16.67%
4/5		2	16.67%
5/5		8	66.67%

3. Maintenance planning/alerts of planted areas

		Answers	Ratio
1/5		2	16.67%
2/5		0	0%
3/5		4	33.33%
4/5		3	25%
5/5		3	25%

4. Socio-economic modelling and valuation of the impact of the trees/planted areas (including the extent of carbon offset)

		Answers	Ratio
1/5		0	0%
2/5		0	0%
3/5		3	25%
4/5		1	8.33%
5/5		8	66.67%

5. Cost benefit assessment for city

		Answers	Ratio
1/5		1	8.33%
2/5		0	0%
3/5		1	8.33%
4/5		4	33.33%
5/5		6	50%

6. Impact of new trees/planted areas on real estate prices

		Answers	Ratio
1/5		1	8.33%
2/5		2	16.67%

Funded by the European Union

3/5		5	41.67%
4/5		2	16.67%
5/5		2	16.67%

7. Monitoring (citizen-based or other) of the state and health of the trees/planted areas

		Answers	Ratio
1/5		1	8.33%
2/5		1	8.33%
3/5		4	33.33%
4/5		4	33.33%
5/5		2	16.67%

From these responses the most highly requested features (as reflected by the number of respondents that rate the feature very important) were: 'location of possible spaces for planting of new trees' and 'socio-economic modelling and valuation of the impact of the trees/planted areas. This was followed by 'cost benefit assessment for the city'.

As to the value add (VA) of such information - in terms of time saved, environmental benefits, increased real estate value, reduced risks, etc.-, it proved a difficult question for the interviewees to answer, with around 60% stating that they had no idea. 3 respondents did they to answer this, but the values they choose ranged from €11K to €500K.

4.3 Roughly what value would you/your organisation give to have such information on hand in a toolbox?

		Answers	Ratio
€5-10K		0	0%
€11-50K		1	8.33%
€51-100K		1	8.33%
€101-500K		1	8.33%
Other		2	16.67%
I have no idea		7	58.33%

Here the 'other' responses included:

- Such information should be provided free-of-charge
- This will be decided by the management of the Sofia Municipality

4.4 What value would you or your organisation put on an annual tree monitoring service?

		Answers	Ratio
€1-5K per year		0	0%
€6-10K per year		0	0%
€11-20K year		0	0%
21-50K year		1	8.33%
I have no idea		6	50%

Funded by the European Union

Other		5	41.67%

50% of respondents could not answer the question as to the value of annual tree monitoring, while 42% answered 'Other' which was clarified as: should be covered by municipality, we don't do tree monitoring, under €1K/year, the management of the Sofia Municipality will decide.

The one respondent who answered this put the value at the top end of the scale at 21-50K/year.

Only one respondent chooses to answer the question on 'Any thing else to add' and their view was that 'focusing only on trees is not entirely correct, as there is a risk that other types of ecosystems (e.g. ponds for climate regulation, shrubs and creepers for green facades and roofs) will be left in the background and out of the public focus'.

3.3 Conclusions of the Survey

From this small survey, we have correctly identified key stakeholders to be involved in the User Stories and the co-creation workshops. This is evidenced by the 83% of respondents that replied that monitoring of the urban trees is important to very important, with all information on trees (position, health, species, size) rated as almost equally important.

In addition, 75% of respondents said that 'climate change adaptation' was very important (5/5) to their organizations, while the other environmental goals of carbon neutrality, nature-based solutions, climate change mitigation and the social value of green areas were recognized as very important by between 60% and 65% of all organizations. If we add the fairly important responses, then this percentage increases from 70% to over 90% depending on the goal. 'Social value of green areas and well-being' was the least important. It is reassuring that the majority of stakeholder respondents put high value on these environmental goals.

In response to the question: 'Is your organisation concerned about the costs or risks of more urban trees and greenery?', 11 responses were affirmative (92%) while only 1 replied that this was not applicable. This overwhelming 'yes' response is somewhat surprising. The next question revealed that 'maintenance costs' stand out as a concern.

Regarding tree attributes, the respondents identified the 'tree type' and 'ability to absorb pollutants' as most important, followed by 'tree height/maturity', 'canopy density' and 'growth rate'. The responses to 'maintenance' and 'root size' were rather varied with a split between important and very important.

When asked about the importance of different impacts of newly planted trees (improved air quality, carbon capture, improve biodiversity, flood avoidance, cooling, noise absorption, community well-being, real estate value and negative impacts), the majority of responses were in the fairly important to very important categories. Air quality, noise absorption, community well-being, and surrounding real estate value show a wider spread in importance, while 100% thought carbon capture, improved biodiversity, flood avoidance, and cooling were important to very important. Interestingly, community well-being (psychological, calming impact of green environment) was rated very important by 8 of the respondents, but only slightly important or important by the rest. In a way this supports the result that 'Social value of green areas and well-being' was considered the least important environmental goal, although not entirely.

Concerning the cost of planting new trees, only 1 respondent answered that it was not important, while

Funded by the European Union

the other 11 responded important to very important. Knowing the cost of maintenance had the same exact response breakdown. In contrast all respondents thought that it was important to very important to know the financial value of the environmental impacts of new trees for their jobs, with over 66% rating it as very important. This should be noted as it impresses the need for the work that will be undertaken in WP5 (Monetary valorization, business cases of planting trees and what-if scenarios).

For the foreseen 100KTREEs services and toolbox, the survey shows that the priorities for information required – in descending order of importance – is as follows:

1. Socio-economic modelling and valuation of the impact of the trees/planted areas (including the extent of carbon offset)
2. Impact of trees and greenery on 20–30-year scenarios of expected change in temperature &

   Impact of trees and greenery on 20–30-year scenarios of expected change in precipitation
3. Create tree planting scenarios with planting costs & socio-economic valuation.

While priorities for toolbox features were revealed to be as follows – again in descending order of importance:

1. Location of possible spaces for planting of new trees & Socio-economic modelling and valuation of the impact of trees/planted areas
2. Cost benefit for the city
3. Maintenance and planning/alerts of planted areas &

   Impact on real estate prices
4. Monitoring of the state and health of the trees/planted areas.

These priorities are important input to the development of the 100KTREEs toolbox and services and will be complemented by the detailed user requirements gathered from the co-creation workshops.

The questions asked about the value add (VA) of such tools and information (in terms of time saved, environmental benefits, increased real estate value, reduced risks, etc.), proved too a difficult for the interviewees to answer, with around 60% stating that they had no idea.

Our sample size for this survey was small with only 12 respondents, but we are confident that we have involved appropriate representatives from key stakeholder groups, and therefore that the results of this survey are significant. As said before, the main purpose of this survey is to provide valuable inputs to the discussions at the subsequent co-creation workshops and the in-depth investigation of the users' requirements.

3.4 Lessons learnt

We recognized that most stakeholders are overloaded with work and do not have much time (and willingness) to answer yet another questionnaire. Even though we kept the questionnaire as short as possible, we only managed to collect 12 responses in total. We could have been more proactive in this respect.

Also, our approach to keep the survey questions limited to stakeholders from our two user cities (Copenhagen and Sofia), could be brought into question. We would have been able to report on a

Funded by the European Union

higher number of responses if we had opened the questionnaire to interested parties outside of these two cities. Having said this, it is an advantage at co-creation to keep the group limited to a smaller number of key stakeholders – as this maximizes the inputs from each individual in the group.

Funded by
the European Union

4 Co-creations workshops

4.1 Methodology

The co-creation workshops employed a multi-faceted methodology to gather valuable insights and collaboratively identify user requirements for a software solution addressing the impact of trees in urban environments.

As shown above the process included:

1. conducting interviews with professionals to generate user stories, capturing specific needs and challenges faced by the target audience.
2. The survey was administered to gather quantitative data and broader perspectives on user requirements.

For the workshop, these inputs served as agenda items or conversation starters, facilitating discussions and brainstorming sessions among participants brought to the workshop as an input from professionals working with trees, urban planning, operation of buildings etc. By leveraging the collective expertise and diverse viewpoints of the professionals involved, the workshop successfully identified key user requirements essential for developing an effective software solution in this domain.

The participants engaged in collaborative activities, such as brainstorming sessions, group exercises, and interactive discussions, guided by facilitators who ensured a structured and inclusive approach. The aim was to foster a creative and open environment where participants could share their insights, exchange ideas, and collectively identify the most critical user requirements for the software solution.

Overall, the methodology employed in the co-creation workshops encompassed a combination of qualitative and quantitative data collection methods, leveraging interviews, user story generation, and surveys. By integrating these approaches, the workshops effectively collected the perspectives of professionals and identified important user requirements for the development of the 100KTrees toolbox.

4.2 Summary of Workshops

4.2.1 Sofia

The in-person co-creation stakeholder workshop was organized in Sofia on 30th May where stakeholders were invited to get together and discuss the project objectives and users' needs and requirements. During the workshop an in-depth presentation of the 100KTrees project was delivered, setting the frame of the planned activities, and expected results, apart from that a live demo was presented by VUB/BitaGreen on similar tool that the 100KTrees aims at developing that was developed for the city of Bratislava which provided the stakeholders with more in-depth understanding of the possibilities that 100KTrees toolbox will provide. The live demo was then followed in an in-depth discussion on the problems stakeholders face in their work related to management, planting and maintenance of the green system in the city of Sofia.

In the workshop there was a mix of participants representing different institutions – there were participants from the local administration, from companies responsible for the park management in the city of Sofia, from the private sector (real-estate) and from the non-governmental sector (producers of plants). During the discussion few key points were identified as main problems that need to be resolved to fulfill city goals related to sustainable development and management of the green system.

Funded by the European Union

4.2.2 Copenhagen

The stakeholder engagement activities in Copenhagen conducted a workshop and meetings with key stakeholders, including the Municipality of Copenhagen, Municipality of Frederiksberg, Local Council of Amager Vest, and KAB (Copenhagen Social Housing Association). The purpose of these engagements was to foster collaboration, gather insights, and align project objectives with the stakeholders' interests and requirements.

Participants included representatives from the Municipality of Copenhagen, the Technical and Environmental Department, including offices of Urban Spaces, Climate Adaptation, and City Data. From the Municipality of Frederiksberg key stakeholders from the municipality in discussions related to urban greening, climate adaptation participates.

The process of establishing a tree policy in the City of Copenhagen has been the starting point of the 100KTrees project. Likewise, Frederiksberg is in a process of alignment of policy areas with the ambition to create more de-siloed processes between urban planning and other departments with a focus on resource efficiency. Both municipalities have carried out substantial work on analysing street trees as part of their policy formation, which was presented at the workshop.

Central to Copenhagen's planning effort is a map, which functions as a backdrop for all employees. The map is a GIS based layer that is produced in QGIS and put onto the internal map service kkkort.kk.dk. A public version exists with the same functionalities (kbhkort.kk.dk). As part of the Tree policy formation locations of potential trees have been calculated from a set of parameters, that follows from regulation, mainly traffic and road specifications, set from national level:

- Distance to facades
- Distance to middle of road
- Distance to intersections
- Distance to underground infrastructure
- Distance to streetlights

The calculations include two location settings: sidewalk and street side parking spaces.

In Frederiksberg, a similar GIS map exists though only with existing trees. Frederiksberg has in turn an ambitious air quality plan that causes some thoughtful re-orientation of the tree policy in the Municipality. It is an ambition that all citizens living in Frederiksberg shall be able to see a tree from their apartment window. However, analysis of air pollution on the streets have shown that in some places, the canopies of trees seem to store the air pollution under the canopies and then actually act to increase air pollution levels, likely from reduced air speed.

A similar conclusion come from the Neighbourhood of Ørestad, where a local project under the Local Council of Amager Vest has measured air pollution in the surroundings of the motorway to Sweden. Here, measurements reveal twice as high volumes of particulates in the park areas with trees as on to the streets. The project here was conducted with the aim to use trees as installations to secure 'non-windy' micro-climates as the construction of many tall buildings in the neighbourhood create a lot of turbulence that damage the propensity to use outdoor spaces.

The following discussion centred on factors to include in a tool. In Frederiksberg, an analysis has been

Funded by the European Union

made showing that a formation of trees placed on to green soil can have the same impact on temperature from the evapotranspiration of trees without the negative impact of increased air pollution. The same interest is found in Copenhagen where ongoing explorations are made to connect the emergence of urban heat islands to ongoing investments in cloudburst infrastructure. In both municipalities there is a drive to establish a green infrastructure that can serve with multipurpose functionalities, pocket parks (there is a policy to establish a maximum distance of 300 meters to nearest pocket park for all citizens), playground, urban heat island mitigation, and cloudburst reservoir. In Frederiksberg, underground reservoirs are being constructed to store rainwater for park use as well.

The multipurpose aspect was seconded by the social housing association. Without the same digital resources of maps and GIS departments an overall wish list included a service to map the location of trees, but also echoed the same ability to optimise to other policies. For them, the ability to include knowledge about trees and their effect on biodiversity and tools to monitor biodiversity. Also, they stressed their financial situation where the only way for them to buy a product is if they can provide it as a service to their local building associations.

Biodiversity is an upcoming policy topic where a central planning concern is to create corridors connecting parks and nature reserves across the city. From this topic a discussion ran if a 100KTrees tool could serve as a partnership builder, where social housing associations and private landowners would be included in the efforts of the municipality to establish green areas for cooling and biodiversity. Copenhagen already has a partnership instrument for trees where the city sponsor trees to private to stimulate tree planting without the high costs of municipal street trees.

In conclusion, the input from the workshop participants in Copenhagen suggests that the existing level of knowledge of trees as a potential instrument for planning of the city but also there is a need for being able to prioritise where and how trees should be put into use. The multipurpose aspect seems very important and is echoed between the participants. It concerns the financing where investments in either biodiversity, cloudburst mitigation, pocket parks etc. needs to align with investments in trees. Planning for the future is also increasingly on the radar. The two municipalities investment plans in creating a green/blue infrastructure need to include the IPCC scenarios to plan for urban heat islands.

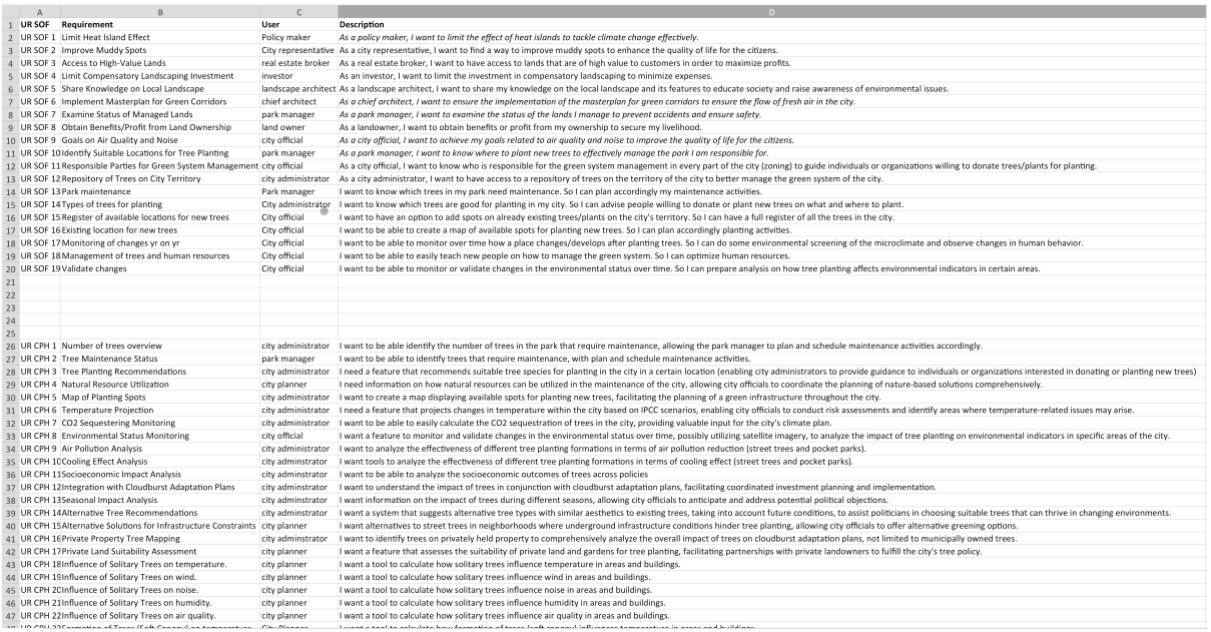
4.3 User requirements

The aim of formulation User Requirements is to provide concrete descriptions of needs based on existing workflows in order for the 100KTrees Toolbox to have the best fit both to provide the needed functionalities but also to fit into existing workflows.

In the workshops, the stakeholders were asked to reveal the specific work processes. These processes have several aspects. For municipalities these include political and technical processes which in turn have different elements depending on job function. The user requirements in the list below are formulated as close to the participants' own formulations in order to maintain as much information as possible. In the list also the job function of the respondent who formulated the requirement, is maintained.

Funded by the European Union

See the full table in the appendix



	A	B	C	D
1	**UR SOF**	**Requirement**	**User**	**Description**
2	UR SOF 1	Limit Heat Island Effect	Policy maker	*As a policy maker, I want to limit the effect of heat islands to tackle climate change effectively.*
3	UR SOF 2	Improve Muddy Spots	City representative	As a city representative, I want to find a way to improve muddy spots to enhance the quality of life for the citizens.
4	UR SOF 3	Access to High-Value Lands	real estate broker	As a real estate broker, I want to have access to lands that are of high value to customers in order to maximize profits.
5	UR SOF 4	Limit Compensatory Landscaping Investment	investor	As an investor, I want to limit the investment in compensatory landscaping to minimize expenses.
6	UR SOF 5	Share Knowledge on Local Landscape	landscape architect	As a landscape architect, I want to share my knowledge on the local landscape and its features to educate society and raise awareness of environmental issues.
7	UR SOF 6	Implement Masterplan for Green Corridors	chief architect	*As a chief architect, I want to ensure the implementation of the masterplan for green corridors to ensure the flow of fresh air in the city.*
8	UR SOF 7	Examine Status of Managed Lands	park manager	*As a park manager, I want to examine the status of the lands I manage to prevent accidents and ensure safety.*
9	UR SOF 8	Obtain Benefits/Profit from Land Ownership	land owner	As a landowner, I want to obtain benefits or profit from my ownership to secure my livelihood.
10	UR SOF 9	Goals on Air Quality and Noise	city official	*As a city official, I want to achieve my goals related to air quality and noise to improve the quality of life for the citizens.*
11	UR SOF 10	Identify Suitable Locations for Tree Planting	park manager	*As a park manager, I want to know where to plant new trees to effectively manage the park I am responsible for.*
12	UR SOF 11	Responsible Parties for Green System Management	city official	As a city official, I want to know who is responsible for the green system management in every part of the city (zoning) to guide individuals or organizations willing to donate trees/plants for planting.
13	UR SOF 12	Repository of Trees on City Territory	city administrator	As a city administrator, I want to have access to a repository of trees on the territory of the city to better manage the green system of the city.
14	UR SOF 13	Park maintenance	Park manager	I want to know which trees in my park need maintenance. So I can plan accordingly my maintenance activities.
15	UR SOF 14	Types of trees for planting	City administrator	I want to know which trees are good for planting in my city. So I can advise people willing to donate or plant new trees on what and where to plant.
16	UR SOF 15	Register of available locations for new trees	City official	I want to have an option to add spots on already existing trees/plants on the city's territory. So I can have a full register of all the trees in the city.
17	UR SOF 16	Existing location for new trees	City official	I want to be able to create a map of available spots for planting new trees. So I can plan accordingly planting activities.
18	UR SOF 17	Monitoring of changes yr on yr	City official	I want to be able to monitor over time how a place changes/develops after planting trees. So I can do some environmental screening of the microclimate and observe changes in human behavior.
19	UR SOF 18	Management of trees and human resources	City official	I want to be able to easily teach new people on how to manage the green system. So I can optimize human resources.
20	UR SOF 19	Validate changes	City official	I want to be able to monitor or validate changes in the environmental status over time. So I can prepare analysis on how tree planting affects environmental indicators in certain areas.
21				
22				
23				
24				
25				
26	UR CPH 1	Number of trees overview	city administrator	I want to be able identify the number of trees in the park that require maintenance, allowing the park manager to plan and schedule maintenance activities accordingly.
27	UR CPH 2	Tree Maintenance Status	park manager	I want to be able to identify trees that require maintenance, with plan and schedule maintenance activities.
28	UR CPH 3	Tree Planting Recommendations	city administrator	I need a feature that recommends suitable tree species for planting in the city in a certain location (enabling city administrators to provide guidance to individuals or organizations interested in donating or planting new trees)
29	UR CPH 4	Natural Resource Utilization	city planner	I need information on how natural resources can be utilized in the maintenance of the city, allowing city officials to coordinate the planning of nature-based solutions comprehensively.
30	UR CPH 5	Map of Planting Spots	city administrator	I want to create a map displaying available spots for planting new trees, facilitating the planning of a green infrastructure throughout the city.
31	UR CPH 6	Temperature Projection	city administrator	I need a feature that projects changes in temperature within the city based on IPCC scenarios, enabling city officials to conduct risk assessments and identify areas where temperature-related issues may arise.
32	UR CPH 7	CO2 Sequestering Monitoring	city administrator	I want to be able to easily calculate the CO2 sequestration of trees in the city, providing valuable input for the city's climate plan.
33	UR CPH 8	Environmental Status Monitoring	city official	I want a feature to monitor and validate changes in the environmental status over time, possibly utilizing satellite imagery, to analyze the impact of tree planting on environmental indicators in specific areas of the city.
34	UR CPH 9	Air Pollution Analysis	city administrator	I want to analyze the effectiveness of different tree planting formations in terms of air pollution reduction (street trees and pocket parks).
35	UR CPH 10	Cooling Effect Analysis	city administrator	I want tools to analyze the effectiveness of different tree planting formations in terms of cooling effect (street trees and pocket parks).
36	UR CPH 11	Socioeconomic Impact Analysis	city administrator	I want to be able to analyze the socioeconomic outcomes of trees across policies
37	UR CPH 12	Integration with Cloudburst Adaptation Plans	city administrator	I want to understand the impact of trees in conjunction with cloudburst adaptation plans, facilitating coordinated investment planning and implementation.
38	UR CPH 13	Seasonal Impact Analysis	city administrator	I want information on the impact of trees during different seasons, allowing city officials to anticipate and address potential political objections.
39	UR CPH 14	Alternative Tree Recommendations	city administrator	I want a system that suggests alternative tree types with similar aesthetics to existing trees, taking into account future conditions, to assist politicians in choosing suitable trees that can thrive in changing environments.
40	UR CPH 15	Alternative Solutions for Infrastructure Constraints	city planner	I want alternatives to street trees in neighborhoods where underground infrastructure conditions hinder tree planting, allowing city officials to offer alternative greening options.
41	UR CPH 16	Private Property Tree Mapping	city administrator	I want to identify trees on privately held property to comprehensively analyze the overall impact of trees on cloudburst adaptation plans, not limited to municipally owned trees.
42	UR CPH 17	Private Land Suitability Assessment	city planner	I want a feature that assesses the suitability of private land and gardens for tree planting, facilitating partnerships with private landowners to fulfill the city's tree policy.
43	UR CPH 18	Influence of Solitary Trees on temperature.	city planner	I want a tool to calculate how solitary trees influence temperature in areas and buildings.
44	UR CPH 19	Influence of Solitary Trees on wind.	city planner	I want a tool to calculate how solitary trees influence wind in areas and buildings.
45	UR CPH 20	Influence of Solitary Trees on noise.	city planner	I want a tool to calculate how solitary trees influence noise in areas and buildings.
46	UR CPH 21	Influence of Solitary Trees on humidity.	city planner	I want a tool to calculate how solitary trees influence humidity in areas and buildings.
47	UR CPH 22	Influence of Solitary Trees on air quality.	city planner	I want a tool to calculate how solitary trees influence air quality in areas and buildings.

4.4 Regulation

During the workshops with the stakeholders, regulatory aspects appeared in different formats. The list of User requirements reveal concrete considerations relating to the CSRD directive and the needs to be able to document and report within this regulation. Another regulatory aspect is compliance with future regulation. This future aspect lies out side an analysis of existing user requirements but nevertheless is important, especially regarding the potential customers in the public sector, i.e. the toolbox must be compliant with technical requirements procurement regulation. Here the European Interoperable Act will be central and likely implemented within the project period of 100KTrees.

The anticipated European Interoperable Act underscores the role of the public sector as a driving force for digitalization across European industries and society. It emphasizes the need for public sector interoperability to support Europe's recovery efforts and resilience by connecting administrations, policies, people, and businesses.

It emphasizes collaborative development, sharing of tools, and enhanced cooperation between suppliers to the public sector's digital transformation. As such it is expected that will be a general requirement and all tools needs to be compliant.

In practical terms it means that the 100KTrees Toolbox needs to be compliant with the Minimal Interoperability Mechanisms (MIMs). Implementation can be different, as long as crucial interoperability points in any given technical architecture use the same interoperability mechanisms. The MIMs are vendor neutral and technology agnostic, meaning that anybody can use them and integrate them in existing systems and offerings, complementing existing standards and technologies. At present there are 10 MIMs:

MIM1: Context Information Management

MIM2: Shared Data Models

MIM3: Ecosystem Transactions Management

MIM4: Personal Data Management

MIM5: Fair Artificial Intelligence

MIM6: Security management

MIM7: Geospatial information management

Funded by the European Union

MIM8: Ecosystem indicator management

MIM9: Data Analytics Management

MIM10: Resource Impact Assessment

In the efforts of the 100KTrees Toolbox the MIMs 1,2, and 7 are the most relevant to integrate.

Funded by
the European Union

5 Conclusions

5.1 Overview of what our users need

When looking across the entirely process of engaging with our potential users a set of use cases can be detected and used in the process ahead. These include:

1. Maintenance of trees
2. Planning of urban green infrastructure
3. Integrations of legal reporting

Use case 1: Maintenance of trees

A new user need was discovered during the engagement process: maintenance of trees is a theme that have come up from the collection of high-level user stories. What the participants forces us to remember is that trees come with a cost that needs to be optimized. Foundational knowledge of location of trees, kind of trees, size of trees etc. are pieces of information in demand. Also, the ability to schedule chores to operational teams are sought for. This includes seasonal aspects as well as monitoring of health of trees, potential damage to buildings etc.

The ask also moves beyond the ability to monitor and schedule. There is an interest in understanding which kind of trees would need less maintenance, i.e. an overview of which kind of trees fit into different environments and conditions in order to reduce maintenance costs. Alternative kind of trees is relevant as there is also a request to provide a choice of trees from an aesthetic perspective.

Use case 2: Planning of urban green infrastructure

The ability to plan green areas in the city is the use case the project has as starting point and is as such confirmed by the city representatives. In the two Copenhagen municipalities the internal GIS services can identify *potential* locations of trees based on calculations of standardized parameters. What they miss is very much the ability to select and prioritize which of the potential locations are to be implemented with planting of trees. Here, the overall ask is to optimise the value created from a broad socio-economic perspective. This ask should be seen as part of the political process, where there is a need for providing reasons for implementation of trees, i.e. what knowledge-based arguments can be provided to citizens as the reasoning for changing parking lots into pocket parks.

The use case was also qualified during the process. A need was articulated to integrate the IPCC climate scenarios as an input into the risk assessment of urban heat islands to identify areas according to the different scenarios. This ask integrates very much with other investment plans, especially the cloudburst installations with a need to enable cross sector integration of public or private ownership of land, an aspect that was mirrored from the other landowners with the wish to be able to align policies on tree management and biodiversity. Also, the prospect of downstream integration was mentioned to plug in trees as a planning tool in the current typology of urban morphology. This ability was seen in context to be able to provide other cooling installations, such as green roofs or walls, in areas where trees can not be planted, from lack of space or underground infrastructure.

Use case 3: Integration to legal reporting

Another aspect that appeared during the engagement process was the focus on the participants' obligations to report to various legal frameworks. For cities there was an interest in reporting to the

Funded by the European Union

climate plan of the city. At EU level this is not a trivial exercise as there currently seems to be three different accounting perspectives in use (see EEA: European Union CO2 emissions: different accounting perspective, EEA Technical report, no. 20/2013).

For the other participants the new EU regulation of CSRD the Taxonomy directive is an active reference for reporting. This includes the investment perspective and the social housing association in Copenhagen that needs report on their ESG related activities.

5.2 Next steps

The next step is to hand over this report on user requirements to the technical teams to translate the user requirements functional descriptions into technical functionalities that can scale across EU. This will infer a demand for unified data of trees but also for data sets on urban environments.

Funded by the European Union

6 Annexes

6.1 Minutes from co-creation workshop – Sofia

WP1

REPORT OF THE 1st CO-CREATION WORKSHOP IN SOFIA 30.05.2023

Antonia Shalamanova (SDA), Desislava Todorova (SDA)

Page BreakPage BreakPage Break

Short Summary

A stakeholder co-creation workshop was organised by SDA in Sofia on 30.05.2023 as part of the 100KTrees WP1 activities to validate, test and discuss the collected user stories from stakeholders during the early months of the project and further analyze how the needs of the Sofia stakeholders incline with the 100KTrees project objectives and goals. During the workshop a presentation of the project was delivered, together with a demo of a similar tool created by one of the project partners BitaGreen for Bratislava. Participants were invited to share within a moderated discussion the problems they face in their work related to the management of the green system in the city and pinpoint the main needs and solutions they are looking for to be added in the 100KTrees toolbox.

Workshops rationale and outlines

Sofia's workshop was organised by SDA who leads the Sofia pilot within the 100KTrees project. SDA's

Funded by the European Union

team was supported by the other local partner OTF who actively participated in the moderation of the discussions and provided in-depth information about the citizen science app that is planned to be used within the project – EdnoDarvo.

The purpose of the workshop was to bring together different stakeholders, who have already stated their user stories and filled out the 100KTrees project online survey and dig deeper into their needs and objectives regarding the green system management and monitoring.
The workshop was organized in two parts. First, a more formal part, including presentation of the project, its goals and objectives and expected results, together with a demo of a tool developed by the 100KTrees project partner BitaGreen for Bratislava showcasing the possibilities the 100KTrees can deliver. The second part of the workshop included a moderated discussion that aimed at digging deeper into the problems and possible solutions different stakeholders encounter in relation to tree planting and monitoring. The end-goal was compiling a list of user requirement to later provide to 100KTrees technical partners to design and develop 100KTrees toolbox so that it satisfies the city needs. To facilitate an open discussion, the co-creation workshop was conducted in the local language – Bulgarian, to ensure that all participating stakeholders will feel comfortable sharing their opinions and ideas.
To moderate and prepare for the co-creation session, NDConsult prepared a draft co-creation workshop guide that was used to facilitate the discussion.

Programme

In the invitation that was distributed for the workshop, SDA prepared a programmed and project short info page that was sent out to the invited participants. A total of 14 organizations were invited to the workshop, 7 of which showed up.

Participants

Apart from the 100KTrees partners from Bulgaria, in the workshop participated representatives of the Sofia Public Parks and Gardens Management Authority, National Park Vitosha management, Green System Department at Sofia Municipality, representative of the biggest real-estate consultancy company on the market – Colliers and representatives of the Bulgarian Association of Ornamental Plants Nurseries (BAOPN).

Discussion

During the facilitated co-creation discussion few main topics were outlined that are of great importance to local stakeholders:

- Estimation of the existing vegetation – all the trees of the city to be digitalized and their ecosystem services to be estimated first having the information of age, characteristics, and location.
- Monitoring of the public greenery is a key priority for the municipal authorities, and this consumes most of the resources (both financial and in terms of manpower).
- Maintenance is of very high priority as this requires a lot of resources and specific planning => it should be prioritized and reduced where not so necessary, e.g. in wild park zones. It should be well known and shown to the society who is responsible for the maintenance of every zone.
- Current legislation is sometimes limiting local authorities in terms of testing new approaches and scenarios.
- Communication with citizens is sometimes difficult and awareness raising is needed to build trust.

Stakeholders were eager to share problems they face in their daily work that could be solved with a monitoring tool that will easy the monitoring of the green system. An issue of great importance that

Funded by the European Union

was mentioned was the need to plan long in advance the tree species that need to be produced to be planted in parks, gardens, roads, sidewalks, etc. It was shared that usually for a tree to be planted in the city it needs 5-6 years to be breeded by tree production plants. Considering climate change and rising temperatures it was further discussed that an analysis of the tree species that will be most appropriate to plant is very helpful thus they may change during the following years. Moreover, it was also discussed that having a tool that can show where trees need to be replaced or need maintenance will be very useful, as currently municipality do not have enough people on the ground to ensure that all the trees in the city are frequently inspected by city experts. It would be highly appreciated to have the information of the urban heat islands as well as the muddy spots around the city where needs to be planted trees. Probably this tool could show that the temperatures are rising and to suggest possible scenarios for adaptation that choose species for planting that are more resistant to high temperatures, dust and drought for example.

There was also a discussion that considered citizen engagement and education using citizen science app or other tools. City experts shared their concerns that sometimes citizens do not possess the right expertise and might not be well prepared to indicate the condition of a tree, however they shared the opinion that this can be solved by providing a picture of the tree a citizen is mapping that can be checked by the experts to confirm its condition. In stakeholders' opinion this can save time for inspections and will build up on the existing tree registry the municipality has.

Citizens or even big companies and SMEs could be of great help to the municipality it they can see and choose throughout the tool trees they want to adopt and to take care of them such as watering them e.g. It could be a good idea to have the option to make volunteer and educational campaigns that can help restoring the connection of people with nature. There could be also zones visible on the map that are considered for compensatory planting. Also, if a citizen or a company wants to plant trees – where it is possible to do it, what are the requirements of this zone, what are the species suitable for this zone, which is the municipal entity that is maintaining this district and a contact person to talk to and inform about your willingness, etc.

Providing a tool that educates not only the citizens that will use the app for citizens science, but also all citizens and guests of the city, will be also highly appreciated. At first step such a tool could provide an instrument for better planning the parks and forming different kinds of parks and zones inside the parks that could be marked on a map. They are supposed to provide different kind of ecosystem services and their maintenance is expected to be different. As a second step through the app / tool citizens could easily informed where the zone for children is, where is the "wild zone" that provides biodiversity that are self-regulated and not human maintained and are as important as the other zones and the city and the wildlife need it.

One of the most important features of the tool could be to help for the planning of parks and preservation of the green corridors and fresh air coming especially from Vitosha Mountain near Sofia. This could help to visualise the green corridors and to show their importance for the city as they are providing an enormous kind and ecosystem services. This could also help for stopping the overbuilding of the city especially with buildings that are high and disrupt the fresh air circulation and the green corridors for preserving biodiversity.

An additional topic was raised by the participants highlighting the need for legislation changes on both national and local level related to the Spatial Planning Law in order to provide municipalities with the right to change ordinances and allow for better planning for green roof, pocket parks and vertical greening on building facades, vertical educational gardens and also will define who is supposed to maintain these alternative forms of greenery in the city after they were built with donations of citizens or corporate sponsors e.g. as the resources for maintenance are much more that the initial investment.

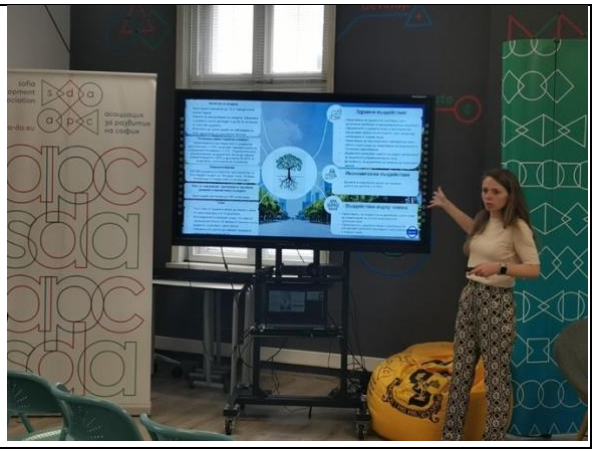
Funded by
the European Union

Regarding the green roofs there should be also technical parameters of the building in the legislation, which must be set in advance by the designers and architects of the buildings so that these roofs can bear the weight of the greenery on it. It was also mentioned that tool that can model the effect on the environment of such initiatives will be very useful to prove their effectiveness and relation to fulfilling climate adaptation plans. These features could be visible only for decision makers while other features that will be useful for citizens - to be open and free for publishing. Citizens on their hand will be interested to see the map of the existing greenery, to see the problematic zones – such as urban heat islands, muddy and dust spots and thus to be a corrective to the local authorities, also to see the options where they can help, to be informed about ecosystem services of different species and green zones as well as the allergens that might affect their health. A good example of some of the features and economic and financial aspects of the ecosystem services of different species could be seen in the NYC Tree Map. This was pointed as a good example, but we should think about our out problems and features of the tool that will be most helpful for solving our specific problems and needs. Such map could provide strong argument in the hand of decision makers to initiate the right changes in legislation and processes of planning, monitoring and maintaining the green and blue systems of the cities. It could provide also strong arguments to citizens for investing in green roof not in air conditioning e.g. if benefits are higher and if individual people and companies and investors are considering not only their personal interest but also public interest and the society as a whole.

Main achievements and follow-up

Main achievement of this workshop was that the 100KTrees project was recognized by stakeholders as valuable addition to their current efforts in relation to green system management and maintenance. It was agreed by all participants that communication should be kept going and they would like to further participate in project initiatives and give their feedback. The group agreed to test and validate future developments of the 100KTrees project.

Pictures of the workshop



Funded by
the European Union

6.2 Minutes from co-creation workshop – Copenhagen

WP1

Minutes of workshop in Copenhagen 23.03.2023

Federated Minutes of the Workshops: Tree Planning and Urban Environment Toolbox

Funded by the European Union

Date: 23rd march 2023
Participants:

- Municipality of Copenhagen
- Municipality of Frederiksberg
- A Social Housing association

Summary:

The workshop aimed to gather insights and requirements for developing a comprehensive toolbox for tree planning and urban environment strategies. The discussions revolved around various aspects, including the impact of the Covid lockdown, transitioning cities to a fossil-free economy, and the need for adapting to climate change.

Introduction:

The workshop emphasized the need for a toolbox that caters to both overall strategies and localized implementations. Participants acknowledged the demand for green urban spaces and the challenges faced by Danish municipalities in achieving a fossil-free economy.

The workshops reflect requirements to fill an overall of providing a toolbox to plan overall strategies as well as very localised implementations.

One of the starting points is the covid lockdown. The lockdown period saw a lack of green and urban spaces where people could move. There is agreement that the return of lockdown scenarios are deemed unlikely, the political demand for green urban spaces remain.

The Danish municipalities see before them the complex task of transitioning their cities into a fossil free economy. In political terms this is encapsulated in a number of policies and pipelines. All municipalities have created climate plan based upon a global framework provided by C40. These focus on mitigation and CO2 reductions, mainly mobility and energy reductions in buildings, and to a lesser degree food systems. This is the perspective the original Tree policy was formulated, as a means to CO2 storage through sequestration.

Closer to the planning efforts of urban spaces are policies of adaptation. In general, these seek to incorporate a range of policies from addressing cloudburst, to providing green spaces, and quality of life to citizens. Within these efforts trees and other nature based solutions are seen as an extension of the 'sponge city' methodology, but also more alignment to the tradition of multi-use design, i.e. urban installations have several functionalities, a LAR solution is a playground, is biodiverse, etc. For a 100KTrees Toolbox the consequence is that it needs to include the same multipurpose perspective and integrate data output to tangent design and analytical efforts.

The efforts are, at present, characterised by a holistic approach that is still on the drawing table across several departments but still to be put into institutionalised practice. The efforts are also in large part un-financed, which means they need to be financed from other investment initiatives.

From an overall perspective the municipalities in Copenhagen look to establish a Green and Blue infrastructure built into the existing fabric of the urban environment.

The following text is a representation of the views expressed by organisational representatives with special attention to requirements to deal with political aspirations set forth by their leadership, to relate the efforts to existing frameworks, and the obstacles they face.

Funded by
the European Union

Street Trees and their location

There is an ongoing effort to plant trees. Given the economic costs of planting trees there is a motivation to understand how to optimise for most value, but also a vacuum on how to quantify the value and to the optimal location of trees. The practical identification of optimal location is constrained by lack of urban space and competition to other installations, i.e new fractions of waste bins or parking lots. It is also constrained by underground installations, sewers, electricity, water etc.

For areas where underground conditions limit the potential for planting trees there is a request for alternatives. In this discussion green rooftops, greening of walls, pocket parks were mentioned as likely remedies requested to be included in the functionalities of the toolbox.

Increasingly, there is an understanding that street trees behave differently depending on the street use. For example, air pollution can build up under a tree canopy if street traffic is intense.

The toolbox of 100KTrees needs to integrate to the typology of street layouts, e.g. high streets or shopping streets, but also the land use and traffic intensity. At the moment the process to collect and layer data to maps is made in QGIS (QGIS) in a manual but updatable workflow. Vector data and layers are preferred.

Corine typology (and/or the 13 street types)

Neighbourhood styles

The tools need to include neighbourhood characteristics. First of all there are historical reasons for building styles of different neighbourhoods, from pre-industrial to post-modern, with consequences for building height, street width etc. Secondly, the variations between neighbourhoods are actively sought to provide variations among the different part. For urban planners in Copenhagen and Frederiksberg the tradition is a strong political influence which the kind of trees are to be planted. The main argument is mainly aesthetic and congruence to already existing trees.

For the toolbox Requirements could include alternative between different types of trees that can integrate to existing tree policy.

Climate change

In 2011 the Copenhagen area was washed by a massive cloudburst. 150 mm of rain in two hours translated in to a city wide investment plan to tackle future cloudbursts including 300 projects to be implemented throughout the city, and a national altitude model for natural water ways.

Increasingly, this adaptation plan is being transformed to include a focus on rising temperatures, likely from the occurrence of higher summer temperatures. The summer of 2022 saw the highest recorded temperatures, the summer of 2018 had the longer time period of draught.

The Climate adaptation plan is built and updated on top of the IPCC scenarios and this integration is being specifically asked for by the adaptation team. At political level investment decisions are made to in concurrence with the scenarios and the planning of the city.

This is relevant with regards to Urban Heat Islands. The city planners foresee a need for a city wide

Funded by
the European Union

analysis of how neighbourhoods and buildings will be affected by rising temperatures calculated from each of the IPCC scenarios.

The tool needs to be able identify specific buildings where heat challenges will arise. The workshops reflected a need to enable the IPCC scenarios for Copenhagen as input to the modelling in order to visualise the heat island effects for each scenario.

Also, the toolbox needs to integrate to the national elevation model.

CO2 accounting and Sequestration

The capacity of trees to sequest CO2 is an essential motivation to plant trees. The information needs to be segmented to type of tree and its age.

Tree Health and Biodiversity

The summer of 2018 impacted the health of trees, especially the chestnut trees where an invasion of Cameraria ohridella, that threatened the entire chestnut population.

For urban planners in Copenhagen and Frederiksberg the tradition is a strong political influence which the kind of trees are to be planted. The main argument is mainly aesthetic and congruence to already existing trees. However, there is a growing realisation among planners that the argument of aesthetics needs a qualification in terms of documentation of tree health for future conditions. The social housing organisation KAB mirrors this same concern: A large part of their building stock is built in the 1950s and 1960s and many have trees and green areas surrounding them. However, the trees are starting to reach an age where they die and there is a need for replacement.

This need for new argumentation connects to an increased focus on biodiversity. Biodiversity is a focus point since 2020 but how remains a challenge. There are different levels to this challenge. At the concrete level, guidelines to which kind of trees to select is in strong demand. Also, how actually to monitor biodiversity in a operational manner. For PensionDenmark there is a policy to be biodiversity positive, i.e. an ambition to regenerate nature as part of their new building projects and increase biodiversity through design of their new projects. For KAB, biodiversity is seen in relation to the efforts of reporting to the CSRD directive, along with the CO2 footprint etc. On a another the overview of how each building and building lots connect to the overall city planning of a green infrastructure is also sought for, also in relation to external financing that can provide trees at minimal costs.

Inclusion of ownership data (OIS data in DK)

Discussion on Requirements:

The toolbox should consider political aspirations, existing frameworks, and the obstacles faced by city administrations. It should provide guidance on maintenance activities, tree selection for planting, registering existing trees, creating maps for planting spots, monitoring changes over time, managing green systems, and analyzing the environmental impact.

Specific considerations for street trees and their location:

Efforts are underway to plant trees optimally, considering economic costs, quantifying value, and determining the optimal location. Challenges include limited urban space, competition with other installations, and underground infrastructure. Alternative solutions such as green rooftops, greening of

Funded by the European Union

walls, and pocket parks should be included in the toolbox.

Neighbourhood Styles:

The toolbox needs to incorporate neighborhood characteristics, historical building styles, and variations among different parts of the city. The selection of tree types should align with aesthetic preferences and existing trees in each neighborhood.

Climate Change and Urban Heat Islands:

The toolbox should address climate adaptation, including the impact of cloudbursts and rising temperatures. Integration with the IPCC scenarios is essential for modeling heat island effects. Data related to street layouts, land use, and traffic intensity should be collected and layered on maps using QGIS.

CO2 Accounting and Sequestering:

The capacity of trees to sequester CO2 should be segmented by tree type and age. The toolbox should provide information and tools for CO2 accounting.

Tree Health and Biodiversity:

The health of trees and the threat of invasive species were discussed, emphasizing the importance of tree health documentation for future conditions. Biodiversity considerations and monitoring guidelines were highlighted, along with the need for an overview of the city's green infrastructure and external financing options.

Inclusion of Land ownership Data:

Integration of ownership data, such as OIS data in Denmark, should be considered for effective tree planning and management.

Funded by the European Union

6.3 Table of user requirements

Attached

Funded by
the European Union

6.4 Questionnaire in English

Attached

Funded by
the European Union

[i] From a field trip in Sofia in May/June 2023, the author can confirm that the green areas are extensive in Sofia

Funded by
the European Union

100KTREEs Survey

Fields marked with * are mandatory.

WELCOME!

A survey promoted by the Horizon Europe project 100KTREEs

The ambition of **100KTREEs project** is provide tools and evidence-based services to decision makers within city authorities.

With this questionnaire we would like to know more about who the stakeholders are, what their interest in urban nature based solutions entails, what information on nature based solutions they need, what environmental aspects are important to the organisations, as well as the 'pains' and 'gains' that you experience regularly in your job.

This questionnaire represents the first step in gaining an insight into the priorities we should set when developing the **100KTREEs toolbox** for our clients. In a second step, we will hold in-depth discussions on toolbox requirements at co-creation workshops.

If you whish to be informed about the outcome of this survey and about our project in general please sign up for more information at the end of this survey. In such a case your personal data will be processed in compliance with the General Data Protection Regulation (GDPR).
More information can be found in our **Privacy Policy**

The time required to complete this survey is **around 5-7 minutes**.

Contact Us in case of any doubt.

Many thanks in advance!

The 100KTREEs team.

Co-funded by
the European Union

Your responses will be used solely for research purposes. The results of the research will be anonymised and you will NOT be identifiable in any published results.

☐ I accept your Terms

Section 1: YOU AND YOUR ORGANISATION

* **1.1 The name of your organisation**

1.2 Your role in the organisation

* **1.3 In which country is your organisation located?**

Please specify "International" or "European" in case of Intergovernmental organisation

- ○ International Organisation
- ○ European Organisation
- ○ Afghanistan
- ○ Albania
- ○ Algeria
- ○ Andorra
- ○ Angola
- ○ Antigua and Barbuda
- ○ Argentina
- ○ Armenia
- ○ Australia
- ○ Austria
- ○ Azerbaijan
- ○ Bahamas
- ○ Bahrain
- ○ Bangladesh
- ○ Barbados

- Belarus
- Belgium
- Belize
- Benin
- Bhutan
- Bolivia
- Bosnia and Herzegovina
- Botswana
- Brazil
- Brunei
- Bulgaria
- Burkina Faso
- Burundi
- Côte d'Ivoire
- Cabo Verde
- Cambodia
- Cameroon
- Canada
- Central African Republic
- Chad
- Chile
- China
- Colombia
- Comoros
- Congo (Congo-Brazzaville)
- Costa Rica
- Croatia
- Cuba
- Cyprus
- Czechia (Czech Republic)
- Democratic Republic of the Congo
- Denmark
- Djibouti
- Dominica
- Dominican Republic
- Ecuador
- Egypt
- El Salvador
- Equatorial Guinea
- Eritrea
- Estonia
- Eswatini (fmr. "Swaziland")
- Ethiopia
- Fiji
- Finland
- France
- Gabon

- Gambia
- Georgia
- Germany
- Ghana
- Greece
- Grenada
- Guatemala
- Guinea
- Guinea-Bissau
- Guyana
- Haiti
- Holy See
- Honduras
- Hungary
- Iceland
- India
- Indonesia
- Iran
- Iraq
- Ireland
- Israel
- Italy
- Jamaica
- Japan
- Jordan
- Kazakhstan
- Kenya
- Kiribati
- Kuwait
- Kyrgyzstan
- Laos
- Latvia
- Lebanon
- Lesotho
- Liberia
- Libya
- Liechtenstein
- Lithuania
- Luxembourg
- Madagascar
- Malawi
- Malaysia
- Maldives
- Mali
- Malta
- Marshall Islands
- Mauritania

- Mauritius
- Mexico
- Micronesia
- Moldova
- Monaco
- Mongolia
- Montenegro
- Morocco
- Mozambique
- Myanmar (formerly Burma)
- Namibia
- Nauru
- Nepal
- Netherlands
- New Zealand
- Nicaragua
- Niger
- Nigeria
- North Korea
- North Macedonia
- Norway
- Oman
- Pakistan
- Palau
- Palestine State
- Panama
- Papua New Guinea
- Paraguay
- Peru
- Philippines
- Poland
- Portugal
- Qatar
- Romania
- Russia
- Rwanda
- Saint Kitts and Nevis
- Saint Lucia
- Saint Vincent and the Grenadines
- Samoa
- San Marino
- Sao Tome and Principe
- Saudi Arabia
- Senegal
- Serbia
- Seychelles
- Sierra Leone

- Singapore
- Slovakia
- Slovenia
- Solomon Islands
- Somalia
- South Africa
- South Korea
- South Sudan
- Spain
- Sri Lanka
- Sudan
- Suriname
- Sweden
- Switzerland
- Syria
- Tajikistan
- Tanzania
- Thailand
- Timor-Leste
- Togo
- Tonga
- Trinidad and Tobago
- Tunisia
- Turkey
- Turkmenistan
- Tuvalu
- Uganda
- Ukraine
- United Arab Emirates
- United Kingdom
- United States of America
- Uruguay
- Uzbekistan
- Vanuatu
- Venezuela
- Vietnam
- Yemen
- Zambia
- Zimbabwe

*** 1.4 Does your organisation fit into one of these categories?**

- [ ] City Authority
- [ ] Municipality
- [ ] Urban planning consultant
- [ ] Private sponsor
- [ ] Real estate developer
- [ ] I don't know

- [ ] Other

1.4.1 If other, please elaborate

1.5 Could you please explain why you are interested in the 100KTREES project?

Section 2: INFORMATION THAT WILL HELP US TO BETTER UNDERSTAND YOUR ORGANIZATION

2.1 Which of these environmental goals are important for your organisation and how would you rate their importance? From not important (1 star) to very important (5 stars).

Carbon neutrality	☆ ☆ ☆ ☆ ☆
Nature-based solutions	☆ ☆ ☆ ☆ ☆
Climate change mitigation	☆ ☆ ☆ ☆ ☆
Climate change adaptation	☆ ☆ ☆ ☆ ☆
Social value of green areas and well-being	☆ ☆ ☆ ☆ ☆

* **2.2 Why is your organisation interested in planting trees and other greenery?**

* **2.3 Is your organisation concerned about the costs or risks of more urban trees and greenery?**

- ○ Yes
- ○ No
- ○ Not applicable

* **2.4 If your organisation does NOT want to plant trees or greenery, do you know the reason why?**

- [ ] Risk of falling branches or trees
- [ ] Planting costs

- [ ] Maintenance costs
- [ ] Damage to existing assets/infrastructure
- [ ] Other unwanted effects
- [ ] Not applicable

* **2.5 Does your organisation value trees and greenery (from an environmental and citizen health / wellbeing perspective) or do they view trees and greenery as a cost only?**

- [ ] I don't know
- [ ] Cost only
- [ ] Trees have some value
- [ ] Trees are highly valued
- [ ] Not applicable

2.6 What costs or risks are most important to your organisation?

Planting costs	☆ ☆ ☆ ☆ ☆
Maintenance costs	☆ ☆ ☆ ☆ ☆
Damage to infrastructure	☆ ☆ ☆ ☆ ☆
Security risks linked with big trees	☆ ☆ ☆ ☆ ☆

2.7 How important is it for your organisation to have information and data on the location and impact of trees to justify the planting of new trees?

Not important / Very important	☆ ☆ ☆ ☆ ☆

* **2.8 Would your organisation be interested in seeking third-party sponsorship to cover the costs of planting new trees?**

- ( ) Yes
- ( ) Not
- ( ) Maybe

Section 3: INFORMATION ABOUT YOUR JOB RELATED TO TREE PLANTING IN THE CITY

* **3.1 Do you have access to a map of the trees and green areas in your city?**

- ( ) Yes
- ( ) No
- ( ) Not applicable

* **3.2 Do you know where in the city there are potential areas to plant additional trees?**

- ( ) Yes
- ( ) No
- ( ) Not applicable

* **3.3 Do you know of parks or brownfield sites where many new trees could be planted?**

- ○ Yes
- ○ No
- ○ Not applicable

3.4 What tree attributes / characteristics are important for your job?

Tree type (evergreen vs deciduous)	☆ ☆ ☆ ☆ ☆
Capability to absorb pollutants	☆ ☆ ☆ ☆ ☆
Tree height / maturity	☆ ☆ ☆ ☆ ☆
Canopy density	☆ ☆ ☆ ☆ ☆
Growth rate	☆ ☆ ☆ ☆ ☆
Maintenance	☆ ☆ ☆ ☆ ☆
Root size	☆ ☆ ☆ ☆ ☆

3.5 For you how important are the different impacts of newly planted trees?

Improved air quality	☆ ☆ ☆ ☆ ☆
Carbon capture	☆ ☆ ☆ ☆ ☆
Improved biodiversity	☆ ☆ ☆ ☆ ☆
Flood avoidance	☆ ☆ ☆ ☆ ☆
Cooling	☆ ☆ ☆ ☆ ☆
Noise absorbtion	☆ ☆ ☆ ☆ ☆
Community well-being (pyschological, calming impact of green environment)	☆ ☆ ☆ ☆ ☆
Surrounding real estate value	☆ ☆ ☆ ☆ ☆
Unwanted/negative impacts	☆ ☆ ☆ ☆ ☆

3.6 How important is it for you to know the cost of planting new trees for your job?

Not important / Very important	☆ ☆ ☆ ☆ ☆

3.7 How important is it for you to know the cost of maintenance of these new trees?

Not important / Very important	☆ ☆ ☆ ☆ ☆

3.8 How important is it for you to know the financial value of the environmental impacts of new trees for your job?

Not important / Very important	☆ ☆ ☆ ☆ ☆

3.9 How important is the monitoring of the trees for your job?

Not important / Very important	☆ ☆ ☆ ☆ ☆

* **3.10 What information do you require on the trees?**

- ☐ Tree position
- ☐ Tree health
- ☐ Tree species
- ☐ Tree size
- ☐ Other

3.10.1 If other, please elaborate

*** 3.11 How often do you (on average) monitor your trees?**

- ○ Annually
- ○ Every 2 years
- ○ Every 5 years
- ○ Other

3.11.1 If other, please elaborate

3.12 Do you consider citizen science (information provided by volunteers and or citizens) helpful for tree management / monitoring?

- ○ Yes
- ○ No

3.12.1 If yes please specify in which way

Section 4: FUTURE TOOLBOX/DECISION SUPPORT SYSTEM

4.1 What information on urban trees would you like to have for your job?

	We already have this information	We don't have this information but we need it	We don't have this information and we don't really need it
* Location and visualization of existing trees	○	○	○
* Location of possible spaces for new trees	○	○	○
* Socio-economic modelling and valuation of the impact of the trees/planted areas (including the extent of carbon offset)	○	○	○
* Create tree planting scenarios with planting costs and socio-economic valuation	○	○	○
* Monitoring of the state of the trees, e.g.tree size, health, etc.	○	○	○
* Tree maintenance planning / alerts	○	○	○
* Impact of trees and greenery on 20-30 year scenarios of expected change in temperature	○	○	○
* Impact of trees and greenery on 20-30 year scenarios of expected change in precipitation	○	○	○
* Return-on-investment (ROI) scenarios for cities	○	○	○
* ROI for real estate investments	○	○	○
* Third party sponsorship options	○	○	○
* Other	○	○	○

4.1.1 If other, please elaborate

4.2 If you had a toolbox for urban trees/planted areas, what would you rate to be most useful feature for your job (each from low 1 star to high 5 stars)

Location and visualization of existing trees/planted areas	☆ ☆ ☆ ☆ ☆
Location of possible spaces for new trees/planted areas	☆ ☆ ☆ ☆ ☆
Maintenance planning/alerts of planted areas	☆ ☆ ☆ ☆ ☆

Socio-economic modelling and valuation of the impact of the trees/planted areas (including the extent of carbon offset)	
Cost benefit assessment for city	
Impact of new trees/planted areas on real estate prices	
Monitoring (citizen-based or other) of the state and health of the trees/planted areas	

* **4.3 Roughly what value would you/your organisation give to have such information on hand in a toolbox? (in terms of time saved, environmental benefits, increased real estate value, reduced risks, etc.)**

- ○ €5-10K
- ○ €11-50K
- ○ €51-100K
- ○ €101-500K
- ○ Other
- ○ I have no idea

4.3.1 If other, please elaborate

* **4.4 What value would you or your organisation put on an annual tree monitoring service?**

- ○ €1-5K/per year
- ○ €6-10K/per year
- ○ €11-20K/year
- ○ 21-50K/year
- ○ I have no idea
- ○ Other

4.4.1 If other, please elaborate

Thank you for completing our survey!

Thank you for taking the time to complete this survey. We truly value the information you have provided. Your responses will contribute to our analyses.
You can find the latest updates on the project here.

Many thanks,

The 100KTREEs project team

Anything else you would like to add?

If you have any comments on the survey or the project, please leave a comment below.

* **Would like to be informed about the follow-up of this survey and the progress of the 100KTREEs project via our e-Newsletter?**

- ○ Yes, keep me informed (we will ask your contact information)
- ○ No thanks

If you want to be updated on the progress of 100KTREEs and further collaborate with us please indicate:

* **Name /Surname**

* **Email**

I hereby authorize the processing of my personal data in conformity with the REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

100KTREEs Survey Privacy Policy

☐ I accept your Terms

[i] From a field trip in Sofia in May/June 2023, the author can confirm that the green areas are extensive in Sofia

Funded by
the European Union