



D7.4: Replication Toolkit

VARCITIES | Work Package 7, Task 7.4

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Table of Contents

1 Introduction to D7.4	15
2 Links between KPIs and Visionary Solutions	16
3 Replication Roadmaps	17
3.1 Castelfranco Roadmap	19
Strategic Vision	19
Replication Pathway	20
Milestones and Indicative Timeline	20
Resources Required	20
Dependencies and Preconditions	21
Key Risks and Mitigation Measures	21
Multiple Benefits Analysis	22
3.2 - Chania Roadmap	25
Strategic Vision	25
Replication Pathway	26
Milestones and Indicative Timeline	26
Resources Required	26
Dependencies and Preconditions	27
Key Risks and Mitigation Measures	27
Chania Multiple Benefits Analysis	28
3.3 - Dundalk Roadmap	31
Strategic Vision	31
Replication Pathway	31
Milestones and Indicative Timeline	31
Resources Required	32
Dependencies and Preconditions	32
Key Risks and Mitigation Measures	32
Dundalk Multiple Benefits Analysis	33
3.4 - Gżira Roadmap	37
Strategic Vision	37

Replication Pathway	37
Milestones and Indicative Timeline	38
Resources Required	38
Dependencies and Preconditions	39
Key Risks and Mitigation Measures	39
Gżira Multiple Benefits Analysis	39
3.5 - Leuven Roadmap	43
Strategic Vision	43
Replication Pathway	43
Milestones and Indicative Timeline	44
Resources Required	44
Dependencies and Preconditions	44
Key Risks and Mitigation Measures	45
Leuven Multiple Benefits Analysis	45
3.6 - Novo Mesto Roadmap	48
Strategic Vision	48
Replication Pathway	48
Milestones and Indicative Timeline	49
Resources Required	49
Dependencies and Preconditions	50
Key Risks and Mitigation Measures	50
Novo Mesto Multiple Benefits Analysis	50
3.7 - Skellefteå Roadmap	54
Strategic Vision	54
Replication Pathway	54
Milestones and Indicative Timeline	55
Resources Required	55
Dependencies and Preconditions	55
Key Risks and Mitigation Measures	56
Skellefteå Multiple Benefits Analysis	56



4	VS Replication Potential & Upscaling Opportunities	61
4.1	- Castelfranco Replication Potential	61
	VS1: Blue and green areas for citizens' H&WB	62
	VS2: Analysis and monitoring of psychological and physiological WB for elderly & people affected by Alzheimer	62
4.2	- Chania Replication Potential	64
	VS1: Mobile Urban Living Room (MULaR)	65
	VS2: Sensor kits	65
4.3	- Dundalk Replication Potential	67
	VS1: Learning Pod	67
	VS2: Outdoor Urban Green Learning & Sensory Garden	67
	VS3: Bike stations with sensors and maintenance facilities	68
4.4	- Gżira Replication Potential	70
	VS1: Micro-greening and pop-up parks	70
	VS2: Citizen Science on Air Quality to Increase Health & Well-Being Awareness	70
	VS3: Educational Community Garden / Art Playground	70
4.5	- Leuven Replication Potential	72
	VS Group 1: (Mobile) Urban Living Room & data collection	73
	VS Group 2: IoT infrastructure for smart lighting & noise measurements	73
4.6	- Novo Mesto Replication Potential	75
	VS Group 1: Brownfield remediation & greening	75
	VS Group 2: Inclusive design of recreational & therapeutic facilities	75
	VS Group 3: Integrated management of facilities	75
4.7	- Skelleftea Replication Potential	78
	VS Group 1: Natural Infrastructure to increase resilience in blue spaces	79
	VS Group 2: Smart Lighting	79
	VS Group 3: Open air educational infrastructure	79
5	Upscaling and Replication guidelines for follower cities	83
5.1	Preconditions for Scaling and Replication	83
5.2	Strategy for Upscaling and Replication	84

Pillar 1: Governance and Institutional Integration	84
Pillar 2: Sustainable Financing and Investment	85
Pillar 3: Technological and Data Infrastructure	85
Pillar 4: Community Engagement and Capacity Building	86
5.3 A Step-by-Step Plan for Implementing Replication	86
6 Conclusions	88
Annex I – Multiple Benefits by city pilot	89
1 Chania	89
2 Gzira	97
3 Skelleftea	102
4 Dundalk	107
5 Castelfranco Veneto	113
6 Leuven	120
7 Novo Mesto	126
Annex II – Theory of Change Infographics per pilot	132

List of Figures

Figure 1 - Replication pathway for the case of Castelfranco.....	20
Figure 2 - Hypothetical replication timeline similar for interventions similar to Castelfranco.	20
Figure 3: Castelfranco Veneto Multiple Benefits Infographic 1	23
Figure 4: Castelfranco Veneto Multiple Benefits Infographic 2	24
Figure 5: Castelfranco Veneto Multiple Benefits Infographic 3	25
Figure 6 - Replication pathway for Chania.	26
Figure 7 - Hypothetical replication timeline similar for interventions similar to the Chania pilot.	26
Figure 8: Chania Multiple Benefits Infographic 1	29
Figure 9: Chania Multiple Benefits Infographic 2	30
Figure 10: Chania Multiple Benefits Infographic 3.....	30
Figure 11 - Replication pathway for Dundalk.....	31
Figure 12 - Hypothetical replication timeline similar for interventions similar to the Dundalk pilot.....	31
Figure 13: Dundalk Multiple Benefits Infographic 1	34
Figure 14: Dundalk Multiple Benefits Infographic 2	35
Figure 15: Dundalk Multiple Benefits Infographic 3	36
Figure 16: Dundalk Multiple Benefits Infographic 4	37
Figure 17 - Replication pathway for Gzira.	38
Figure 18 - Hypothetical replication timeline similar for interventions similar to the Gzira pilot.	38
Figure 19: Gzira Multiple Benefits Infographic 1	40
Figure 20: Gzira Multiple Benefits Infographic 2	41
Figure 21: Gzira Multiple Benefits Infographic 3.....	42
Figure 22: Gzira Multiple Benefits Infographic 4.....	43
Figure 23 - Replication pathway for Leuven.	44
Figure 24 - Hypothetical replication timeline similar for interventions similar to the Leuven pilot.....	44
Figure 25: Leuven Multiple Benefits Infographic 1	46
Figure 26: Leuven Multiple Benefits Infographic 2	47
Figure 27: Leuven Multiple Benefits Infographic 3	48
Figure 28 - Replication pathway for Novo Mesto.....	49
Figure 29 - Hypothetical replication timeline similar for interventions similar to the Novo Mesto pilot.	49
Figure 30: Novo Mesto Multiple Benefits Infographic 1	51
Figure 31: Novo Mesto Multiple Benefits Infographic 2	52



Figure 32: Novo Mesto Multiple Benefits Infographic 3	53
Figure 33 Novo Mesto Multiple Benefits Infographic 4	54
Figure 34 - Replication pathway for Skelleftea	55
Figure 35 - Hypothetical replication timeline similar for interventions similar to the Skellefteå pilot.	55
Figure 36: Skelleftea Multiple Benefits Infographic 1	57
Figure 37: Skelleftea Multiple Benefits Infographic 2	58
Figure 38: Skelleftea Multiple Benefits Infographic 3	59
Figure 39: Skelleftea Multiple Benefits Infographic 4	60
Figure 40: Castelfranco's Future Development.....	62
Figure 41: Scaling Mobile Urban Living Room	65
Figure 42: Dundalk's Sustainable Community Hub	68
Figure 43: Scaling Digital Twin Technology	71
Figure 44: Scaling Leuven's Olevodrome Project.....	73
Figure 45: Expanding Green and Digital Infrastructure	76
Figure 46: Project impact ranges from local to widespread adoption.	80
Figure 47: Replication Pillars infographic	84
Figure 48: 5-step plan for implementing VS replication	86

List of Tables

Table 1 - Risks and mitigation measures related to interventions similar to those done in Castelfranco.....	21
Table 2 - Risks and mitigation measures related to interventions similar to those done in Chania.....	27
Table 3 - Risks and mitigation measures related to interventions similar to those done in Dundalk.....	33
Table 4 - Risks and mitigation measures related to interventions similar to those done in Gzira.....	39
Table 5 - Risks and mitigation measures related to interventions similar to those done in Leuven.....	45
Table 6 - Risks and mitigation measures related to interventions similar to those done in Novo Mesto.....	50
Table 7 - Risks and mitigation measures related to interventions similar to those done in Skellefteå.....	56



Abbreviation list

Term	Description
VS	Visionary Solution
KPI	Key Performance Indicator
ToC	Theory of Change
IoT	Internet of Things

Executive Summary

The toolkit distils seven pilot experiences into practical guidance on how cities can plan, resource, and implement similar solutions. The lessons learnt from Castelfranco Veneto, Chania, Dundalk, Gżira, Leuven, Novo Mesto, and Skellefteå are used to provide step-by-step roadmaps, outlining how the visionary solutions can be adapted elsewhere. The toolkit is designed to support decision makers, city planners and other stakeholders who wish to replicate solutions in their own cities.

The Toolkit links Visionary Solutions (VSs) to measurable outcomes through a set of Key Performance Indicators (KPIs), ensuring that cities can monitor impacts on environment, health, and social life. Each roadmap outlines a strategic vision, major implementation steps, indicative timelines, required resources, key dependencies, and principal risks to support informed replication decisions.

Replication potential is assessed across all VSs: while modular greenery, citizen science, and sensor-based monitoring are widely transferable, others require adaptation to specific cultural or climatic contexts. Crucially, success depends on enabling conditions: strong governance, sustainable financing, robust data systems, and inclusive engagement.

Not all solutions are universally transferable in all contexts. The toolkit highlights which elements are widely applicable, and which require adaptation to local needs such as the specific contexts of institutional or socio-cultural conditions.

The Toolkit proposes a four-pillar strategy—governance, finance, technology, and community engagement—supported by a five-step plan from cross-departmental coordination to continuous monitoring.

1 Introduction to D7.4

A VARCITIES Replication Toolkit was developed to enable city administrators and other interested entities to implement any of the VSs, that includes a step-by-step process through a roadmap. Clear guidelines are included, explaining how VSs should be implemented in similar contexts to those of the VARCITIES pilot cities for the possibility of achieving a similar impact. Each pilot VS is attributed to specific outcomes, enabling prospective replicators to link the impact to the VSs to facilitate the selection of VSs.

The VARCITIES Replication Toolkit is a practical guide to help other cities implement the project's integrated Visionary Solutions that improve health, well-being and resilience in pilot sites. Its purpose is to share outcomes from the VARCITIES pilots in clear, step-by-step roadmaps. In plain language, it explains what was done, why it matters, and how to do it elsewhere.

This document is structured to guide the user through the replication process. We will begin with an overview of the Key Performance Indicators (KPIs) in alignment with the VSs in Section 2, which are crucial for measuring success. The core of this toolkit is the detailed Replication Roadmaps for each pilot city in Section 3, providing a blueprint for implementation. Finally, Section 4 and 5 offer insights into replication potential and guidelines for adapting these solutions to your own city

The toolkit reflects VARCITIES's co-creation approach: local governments work with researchers, businesses and communities to design green-blue infrastructure and smart services that benefit society. By structuring this knowledge, the toolkit aims to give city planners and practitioners a common framework and guidelines for replicating what worked. In short, it shows the who, what, when and how of each pilot VS, distilled into user-friendly checklists, timelines and recommendations. The replication roadmap is structured into a number of pillars including the strategic vision, pathway, milestones/timelines, resources needed, dependencies, risks/mitigation measures, multiple benefits and outcomes. This enables the users of this document to find parallels between their specific plans with the experiences gained from VARCITIES. This link was considered crucial in the design of this document.

Cities worldwide face similar health, climate and social challenges. VARCITIES treats each pilot city as a "Visionary City" testbed for green and digital innovation. The Toolkit turns these pilot experiences into general advice that any city can adopt. For example, VARCITIES developed guidelines to capture existing knowledge about successful methods, projects, and activities and make this knowledge available for future reuse and replication. This means that entities implementing VSs can follow the roadmap instead of reinventing the wheel. The Toolkit includes overview pages on project objectives, summaries of monitored impacts and co-creation processes, and city-by-city roadmaps. Each roadmap contains the lessons learnt, best practices, synergies between actions, and trade-offs to consider. It also highlights minimum requirements (e.g. infrastructure, policies or actors needed). By reading it, anyone can understand how a pilot was planned and measured, and what to expect when replicating similar VSs in their own city. A Theory of Change (ToC) - a chain of steps from inputs to outcomes - is included in Annex I for each pilot site.

2 Links between KPIs and Visionary Solutions

A core part of VARCITIES is measuring impact through Key Performance Indicators (KPIs). Each pilot city tracked data on its Visionary Solutions to understand how well the interventions worked. The Toolkit summarizes these findings for non-experts. In simple terms, KPIs are metrics or scores that capture effects like air quality, temperature comfort, biodiversity, energy savings, or people's sense of well-being. By comparing KPIs before and after the projects, VARCITIES quantified the benefits of nature-based solutions. For example, recommended KPIs include carbon stored in plants, energy saved by renewable sources, water retention by soil and vegetation, physical and chemical water quality, counts of native species, temperature and humidity levels, and even measures of human comfort like the Physiological Equivalent Temperature (PET), among many others.

These indicators connect directly to the pilot objectives. If a pilot adds trees and wetlands, we expect to see higher carbon capture and better air and water quality. If it builds parks or green bike routes, we measure things like reduced noise, more bike traffic (using sensors) or increased park visits.

Each KPI is tied to one or more Visionary Solutions. For instance, Castelfranco's garden upgrades (VS1, VS3, etc.) were evaluated by KPIs such as microclimate cooling, users' health surveys, and sensor data on garden usage. Chania's urban living room furniture (VS1) and smart bike stations were evaluated by KPIs on physical activity levels and environmental data. In VARCITIES, the Monitoring & Evaluation framework ensures every KPI has a clear purpose. In other words, if a solution aims to improve well-being in a park, you'll find KPIs that measure well-being (surveys, wearable sensors) as well as environmental quality (air/water metrics). Links between KPIs and VSs can be found in D7.3, Section 4 under each indicator title.



3 Replication Roadmaps

In this section, the roadmap of each pilot towards achieving success is plotted based on a number of pillars including the strategic vision, replication pathway, milestones/timelines, resources, dependencies, risks/mitigation measures. Best practices are shared successes that should be highlighted based on the multiple benefits. Synergies represent the various elements that came together to improve one another, and trade-offs show the elements that had to be left out or discarded in order to allocate more resources to other pertinent tasks.

This section provides a comprehensive guide for each of the seven pilot cities. As the users explore the roadmaps, they will find common themes and challenges. For example, several cities, including Castelfranco and Gzira, focused on co-creation and participatory workshops, offering valuable lessons for community engagement. We encourage you to look for these connections to find the most relevant insights for your own projects. One can find more about the replication potential of each Visionary Solution in Section 4.

It is often the case that certain risks manifest themselves throughout the project lifecycle, and unexpected obstacles are encountered, requiring the responsible team to think of ad hoc mitigation actions that would be achievable with the resources available at the time. The subsections below capture all these nuances by the pilot leaders, and provide readers with insights regarding aspects that had to be prioritised to ensure that objectives are met at the most efficient level possible during the current project phase. For each pilot city Replication Roadmap, a structured step-by-step package to replicating VARCITIES VSs is demonstrated. Each city roadmap has the following sections:

Strategic vision: A brief strategic vision for the pilot is given. A much more in-depth consideration of each pilot's vision is provided in deliverables related to WP6, particularly deliverable D6.2.

Replication pathway: This provides a brief and practical overview of the steps involved in replicating such a solution. There are two aspects of these replication pathways per pilot that are worth noting. First, the general structure of each pathway is similar and this is important to allow easy adaptation to follower cities. The second aspect is that there are some steps that may be specific to the pilot implementation. In this case, the replication pathway needs to be adapted accordingly depending on the need.

Milestones and indicative timeline: The timelines and milestones for each pilot are provided as indicative. The timelines might not necessarily reflect the specificity of the project that has the



intention to replicate. Rather it provides an indicative framework based on the experience gathered in the VARCITIES pilots.

Resources required: There is a wide variety of resources that may be required. The ones provided in this framework are kept as generic as possible to encompass possible needs by follower cities. This is especially important given the context of the seven pilot cities involved in this initiative, where local contexts vary widely. By fostering co-monitoring and co-creation practices across these cities, stakeholders, ranging from local governments and civil society organizations to community members, are encouraged to jointly design, implement, and assess M&E activities. This collaborative approach not only strengthens the relevance and inclusivity of the data collected but also ensures that monitoring and evaluation processes are adaptable to the unique socio-cultural and demographic characteristics of each city.

Dependencies and pre-conditions: Similar to the case of required resources, the dependencies and pre-conditions may vary widely in the case of follower cities that intend to replicate the solutions. The ones provided here refer to the case of the VARCITIES pilots. Nevertheless, these are also kept high level and generic to allow follower cities to identify possible challenges and dependencies that may be encountered.

Risks and mitigation measures: Risks and their mitigation have already been identified in another deliverable. The core risks are identified here in order to enable follower cities to identify these possible risks for their own implementations. A more detailed risk register can be found in D6.2.

Multiple Benefits Analysis: Monitoring and evaluation (M&E) are crucial for successful project and policy implementation, ensuring objectives are met and outcomes delivered effectively. While traditional M&E focuses on direct results, there's growing emphasis on capturing the multiple, often indirect benefits that emerge throughout a project. These benefits can span environmental, social, economic, and digital dimensions, offering a more comprehensive view of a project's value beyond its immediate goals.

For European Union initiatives, understanding and documenting these diverse benefits is essential for informed decision-making and contributes to the long-term sustainability and effectiveness of interventions. By integrating a wider range of benefits into M&E frameworks, stakeholders can better understand broader impacts, including unintended consequences, and adapt strategies accordingly. This approach aligns with key EU priorities like the Green Deal, the Digital Strategy, and the 2030 Agenda for Sustainable Development. This section explores the concept of multiple benefits within M&E, highlighting the importance of identifying and measuring these impacts and the methodologies that can be used. It emphasizes the value of integrating these broader benefits into M&E processes for EU-

funded projects and policies, offering insights into how M&E can evolve to support more sustainable and inclusive development across Europe.

Each roadmap includes a summary of expected co-benefits. For instance, a primary goal might be air quality, but nature-based projects often bring multiple benefits such as biodiversity, job creation, and recreation. While each city's roadmap is tailored to its local context, the Toolkit translates this into universal advice. For example, Castelfranco's roadmap details managing historic gardens and involving Alzheimer's care groups, but the underlying principle of engaging relevant community groups in co-design is applicable to other urban parks. However, some solutions are context-specific and require similar climatic or environmental conditions to be impactful.

The data collection process for evaluating Visionary Solutions (VS) uses a multi-faceted approach to quantify their diverse benefits in urban settings. This begins with a pre-assessment synthesizing outcomes from 20 prior EU-funded projects, categorizing benefits into Nature-based Solutions (NbS), Digital Solutions, and Socio-cultural Solutions. These findings are then aligned with global frameworks like the UN Sustainable Development Goals (SDGs) and the OECD Well-being Framework for a comprehensive understanding of their societal impact.

To measure these benefits effectively, a robust methodology was developed, involving the definition of Key Performance Indicators (KPIs) for each VS type. These range from carbon storage and biodiversity metrics for NbS, to sensor installations and active users for Digital Solutions, and visitor engagement and well-being scales for Socio-cultural Solutions. These KPIs form the basis of a comprehensive monitoring protocol applied across all project phases. The methodology was refined through a collaborative process, linking pre-assessment benefits to the newly defined KPIs and validating them with project partners.

A crucial step in data collection was an online focus group survey. Experts from each pilot project evaluated the implementation of identified Multiple Benefits (MBs) within their pilots and assessed the relevance of the associated KPIs. This interactive approach fostered constructive debate and provided in-depth insights into each solution's impact. The outcome of this process is a comprehensive framework that maps implemented MBs and their monitoring KPIs, and also suggests potential KPIs for future implementations and replications, enabling a multidimensional assessment of VS beyond traditional financial metrics.

3.1 Castelfranco Roadmap

Strategic Vision

The overall vision of the Castelfranco pilot was to restore a park area and its surroundings with the aim of improving accessibility. In addition, health and well-being of its users are



targeted using digital and socio-cultural solutions to enhance the use of green spaces rather than re-inventing new ones.

Replication Pathway

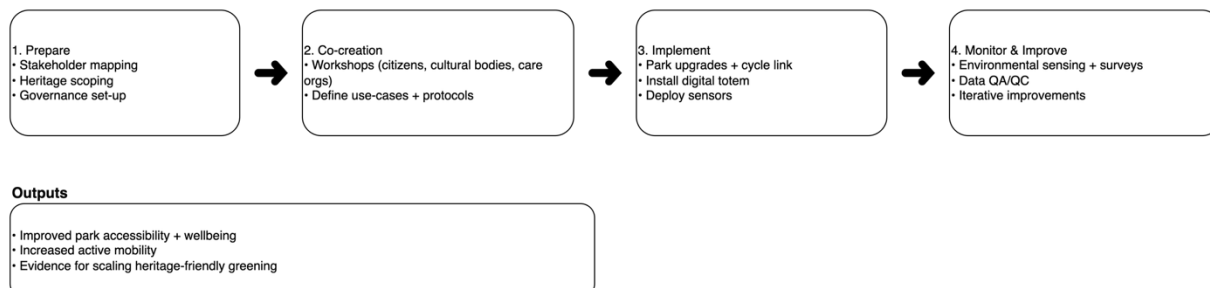


Figure 1 - Replication pathway for the case of Castelfranco.

Milestones and Indicative Timeline

A hypothetical replication timeline for interventions that may have parallels and similarities to the Castelfranco visionary solutions is presented below in Figure 2.

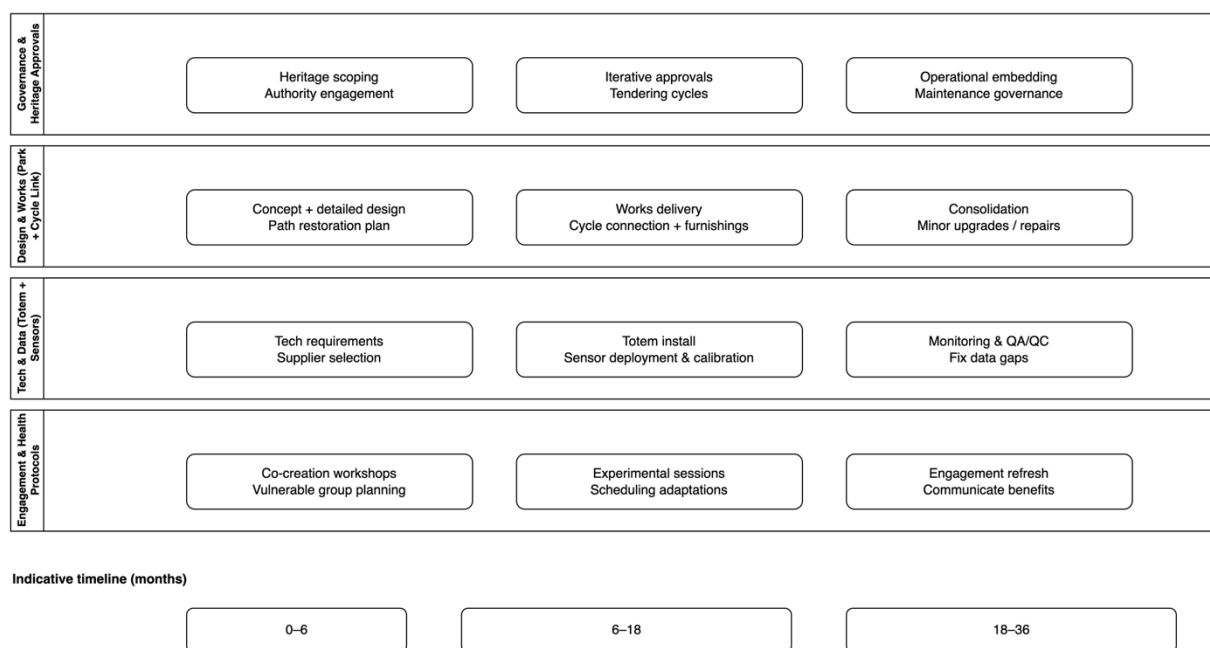


Figure 2 - Hypothetical replication timeline similar for interventions similar to Castelfranco.

Resources Required

The resources that may be required include:

- Staff from municipality including workers



- Health and well-being experts to support in decision making
- Suppliers of sensor hardware
- Sensor maintenance budget
- Capital investment

Dependencies and Preconditions

From the experience gathered from this project, one can identify the following dependencies and preconditions:

- Heritage or/and planning authority approvals
- Technical experts
- Health and well-being expertise
- Access to supportive or alternative funding possibilities

Key Risks and Mitigation Measures

In terms of the risks and mitigation measures, Table 1 shows the key risks and the proposed mitigation measures. Evidently these need to be expanded depending on the particulars of the intervention being proposed.

Table 1 - Risks and mitigation measures related to interventions similar to those done in Castelfranco.

Risk	Mitigation
There is a risk that the digital components supply is delayed because of the current digital component global crisis, the European conflict	Plan for a different timing or implementation strategy
There is a risk that the experimental activities concerning the VS2 are going to be delayed or modified because the recruitment of participant and the availability of caregivers to participate to the experimental phase is halted or threatened	The recruitment of healthy older adults with normal aging (e.g., without dementia) should be prioritised
There is a risk that there will be an increase of the material costs due to the international context (obstacles on the release of recovery and resilience fund)	Adoption of new municipality decrees according to the ministry legislation
There is a risk that the data obtained is not suitable to be presented because of various errors/anomalies	Avoid by continuously monitoring

Multiple Benefits Analysis

This subsection presents the multiple benefits generated by Castelfranco's interventions. These go beyond the initial objectives and encompass social, environmental and health-related gains. Castelfranco Veneto's visionary solutions primarily involved developing digital and socio-cultural solutions in collaboration with local associations, the municipality, and the University of Padua. The VS at this site mainly aimed to improve accessibility to and use of the park, collecting useful data in collaboration with Alzheimer's patients at the local retirement home. No new green spaces were created in Villa Bolasco Park, where KPIs were monitored and collected. Outside the villa walls, however, a new cycle lane was developed, acting as a green connection from the city centre to the area, as well as a new furnished public space. These diagrams serve as an indication of the benefits results from interventions that are similar to this pilot and should be used by relevant stakeholders to have a quick indication of what would be expected as an outcome/result.



Credits: Eurac Research

Figure 3: Castelfranco Veneto Multiple Benefits Infographic 1

VISIONARY SOLUTIONS CASTELFRANCO VENETO - Group 12

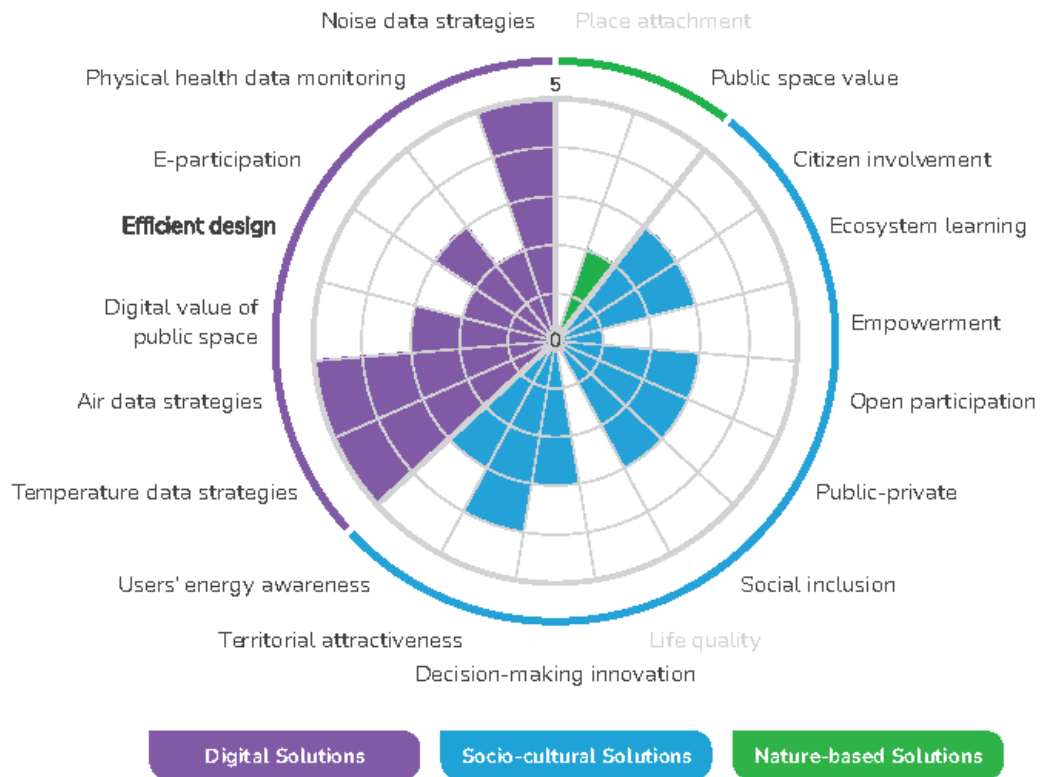


Figure 4: Castelfranco Veneto Multiple Benefits Infographic 2

VISIONARY SOLUTIONS CASTELFRANCO VENETO - Group 13

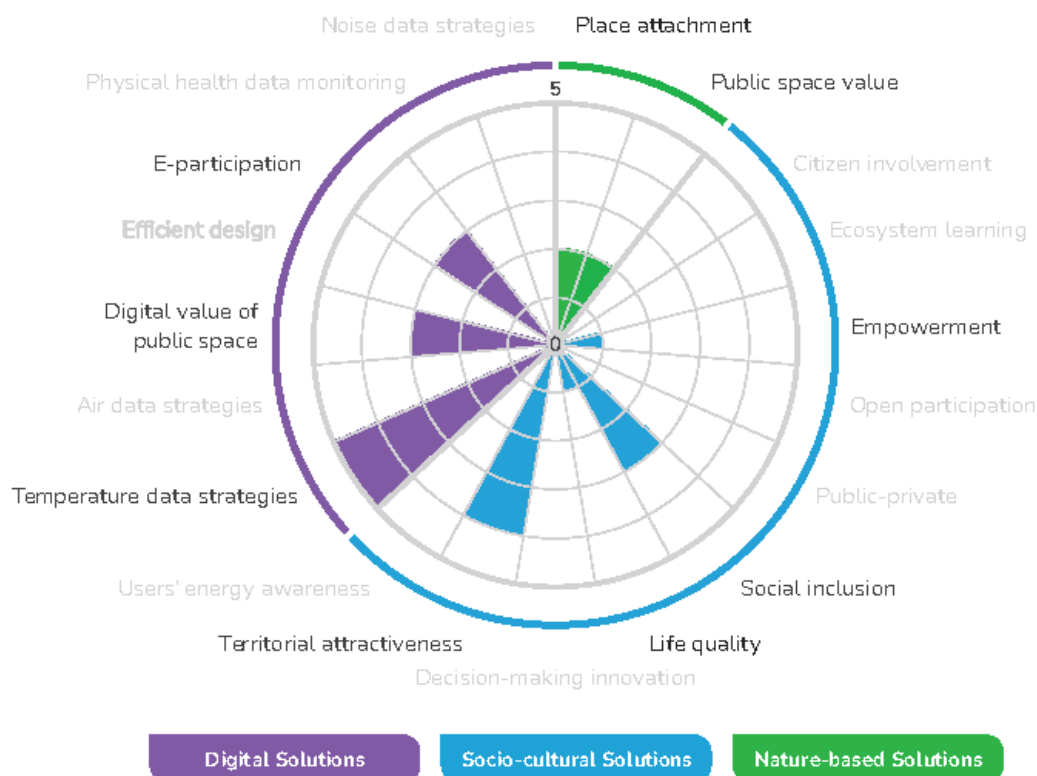


Figure 5: Castelfranco Veneto Multiple Benefits Infographic 3

3.2 - Chania Roadmap

Strategic Vision

The Chania pilot general vision is to provide visionary solutions that communicate and inform city users about environmental and health and well-being impacts by using co-creation activities that are targeted as well sensor technologies to provide an extensive data base.

Replication Pathway

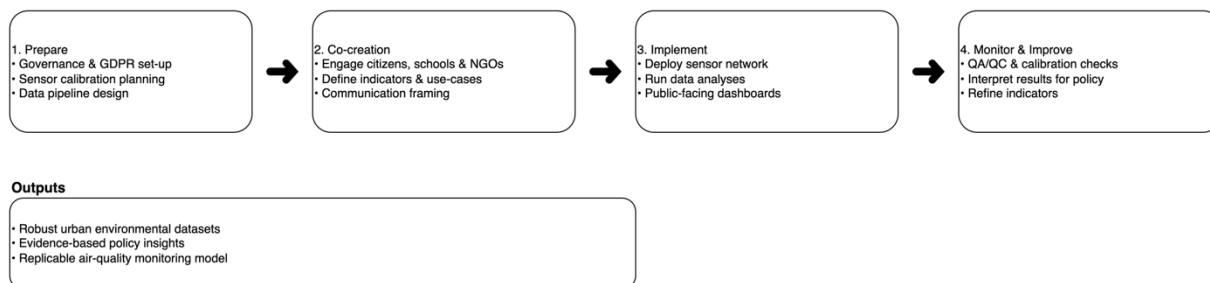


Figure 6 - Replication pathway for Chania.

Milestones and Indicative Timeline

An indicative timeline for interventions similar to those in Chania is given in Figure 7. This would have to be adapted depending on context.

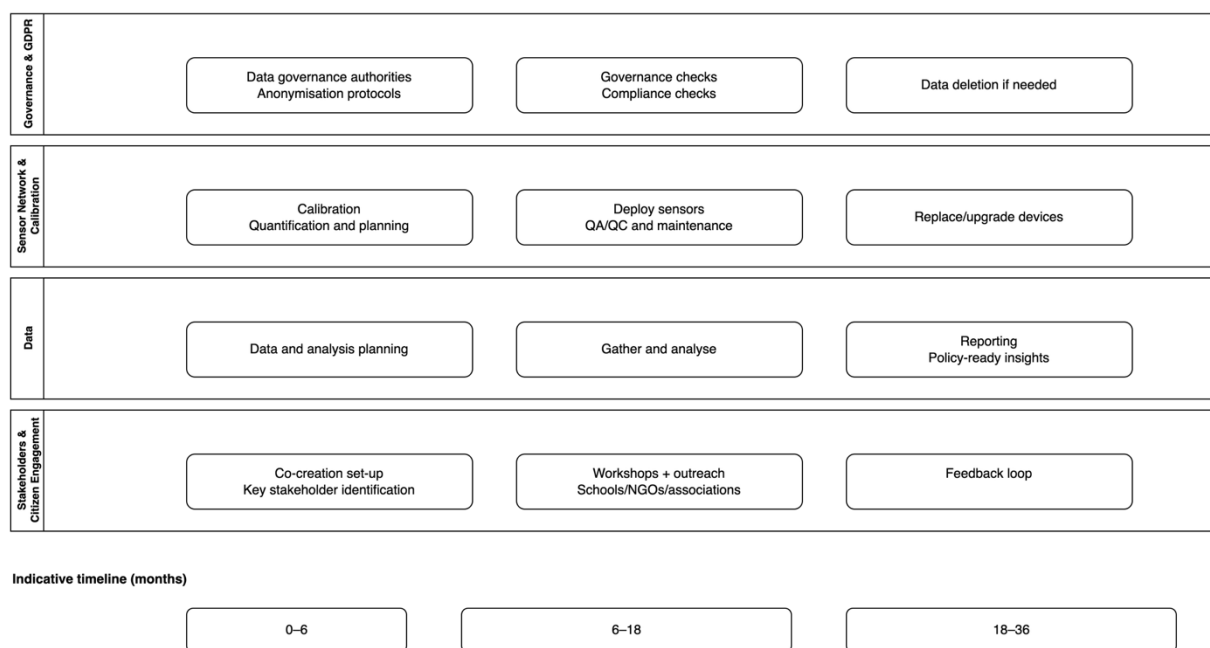


Figure 7 - Hypothetical replication timeline similar for interventions similar to the Chania pilot.

Resources Required



The following resources are expected and needed when having visionary solutions similar to those of Chania:

- Technical expertise related to sensors and their distributed use
- Engineering/scientific human resources
- Moderate digital infrastructure investment

Dependencies and Preconditions

The following dependencies and preconditions are expected

- Community awareness and community building
- GDPR compliance
- Technical infrastructure to be able to carry out and sustain measurements

Key Risks and Mitigation Measures

Table 2 - Risks and mitigation measures related to interventions similar to those done in Chania.

Risk	Mitigation
There is a risk that the MULR's implementation will be delayed because there are no ready-made vehicles for the project's needs due to international conditions	Replacement of the implementation of a converted mini-van with a vehicle carrying a portable construction, ensuring the on-time project's implementation
There is a risk that there is low level of awareness about the effects to H&WB of poor air quality and noise exposure	Awareness campaigns , dedicated workshops , press releases, word of mouth dissemination
There are a risk of thefts and vandalisms of the bicycle sensor kits	Anti-theft and anti-vandalism design, communication so as to make the public realise the health effects of the VS and, thus, protect them themselves
There is a risk that inflation will derail the cost estimate	Proceed fast with the procurement and negotiate better prices

Chania Multiple Benefits Analysis

This subsection reviews the broader impact of the Chania pilot, demonstrating the environmental, social and educational benefits of nature-based solutions. While the Chania pilot did not increase the amount of green space, it placed a strong focus on monitoring nature-based solutions using various sensors and environmental analysis techniques. This was considered important in terms of its indirect environmental impact, as it enabled the municipality to make informed decisions and increased local knowledge through capacity building. The digital and social benefits refer to the two solutions that explored new ways of integrating digital solutions for citizen engagement and citizen science.



Credits: Eurac Research

Figure 8: Chania Multiple Benefits Infographic 1

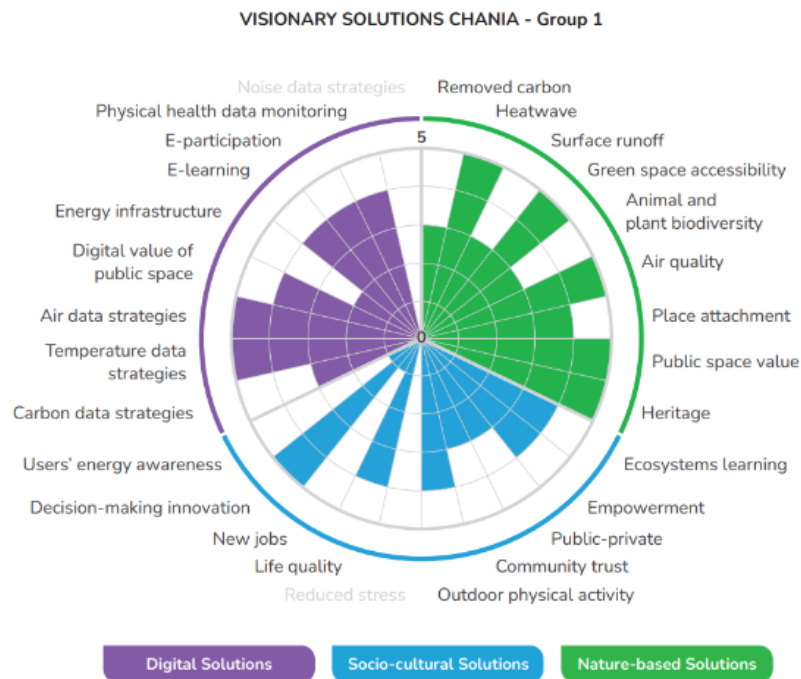


Figure 9: Chania Multiple Benefits Infographic 2

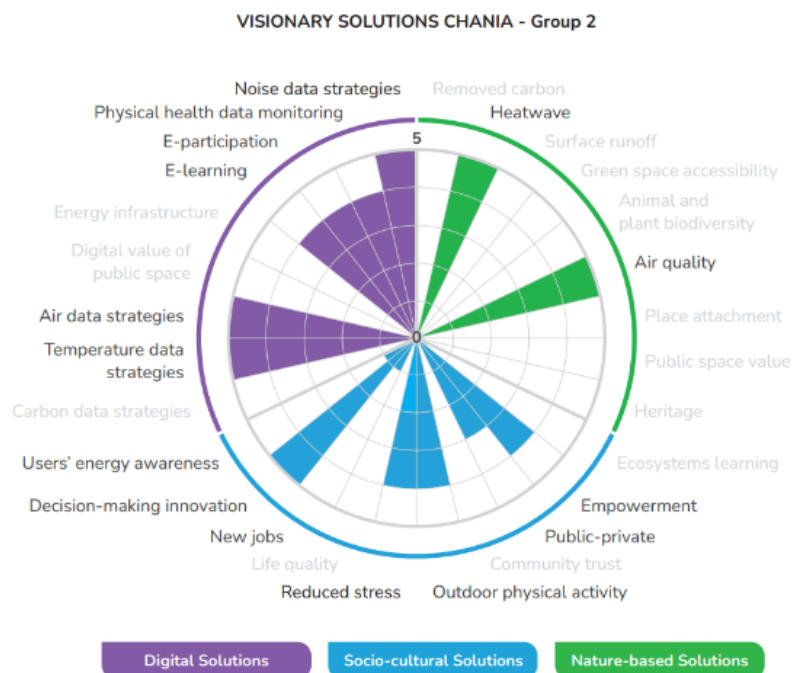


Figure 10: Chania Multiple Benefits Infographic 3

3.3 - Dundalk Roadmap

Strategic Vision

The strategic vision of the Dundalk pilot was to create a multifunctional community hub that integrates various elements including green infrastructure, renewable energy, and inclusive public space to enhance urban resilience.

Replication Pathway

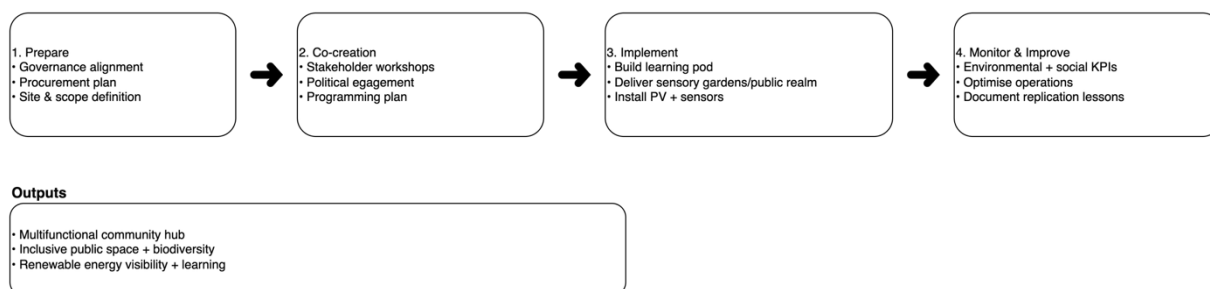


Figure 11 - Replication pathway for Dundalk.

Milestones and Indicative Timeline

A typical timeline is provided in Figure 12 for visionary solutions that have a similar nature to that of the Dundalk pilot.

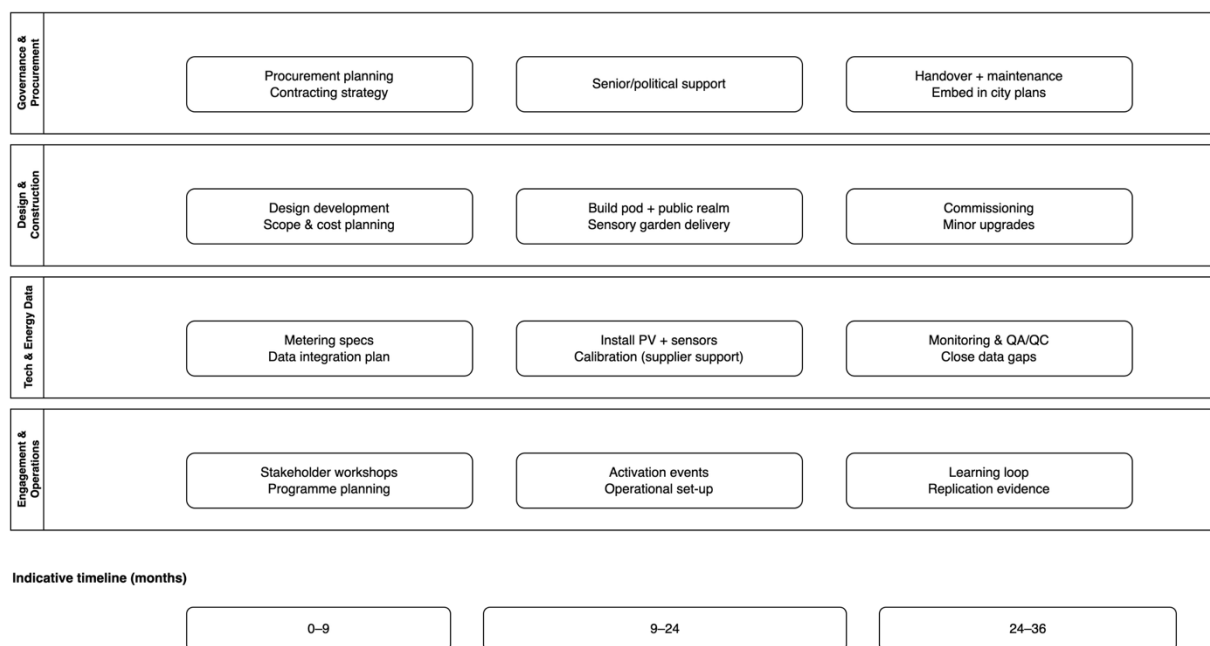


Figure 12 - Hypothetical replication timeline similar for interventions similar to the Dundalk pilot.

Resources Required

Some of the required resources are provided hereunder:

- Capital investment
- Cross-departmental coordination such as expertise in Occupational Therapy
- Engineering and project management expertise

Dependencies and Preconditions

The following dependencies are expected when endeavouring in similar projects:

- Procurement knowhow and familiarisation
- Political support
- Reliable suppliers

Key Risks and Mitigation Measures

The key risks and the respective mitigation measures are indicated in Table 3.



Table 3 - Risks and mitigation measures related to interventions similar to those done in Dundalk.

Risk	Mitigation
Procurement delays	Prioritise the procurement process as early as possible
Lack of evidence based positive outcomes	Engage experts early, particularly health and well-being experts
Difficulties in citizen engagement	Consider engagement through event organisation addressed at various age groups

Dundalk Multiple Benefits Analysis

This subsection illustrates the multiple benefits identified through the interventions, which extend beyond the primary objectives to encompass social, environmental and health-related gains. Dundalk's pilot project utilised the area near the library to create sensory gardens and facilitate slow mobility integration, offering numerous social and environmental benefits. This initiative encouraged the integration of various library user groups, including migrants, children with disabilities, and local associations. Digital solutions were successfully integrated into the process, demonstrating that technology can be an effective tool for disseminating information and helping people to understand the full scope of a project.



Credits: Eurac Research

Figure 13: Dundalk Multiple Benefits Infographic 1

VISIONARY SOLUTIONS DUNDALK - Group 9

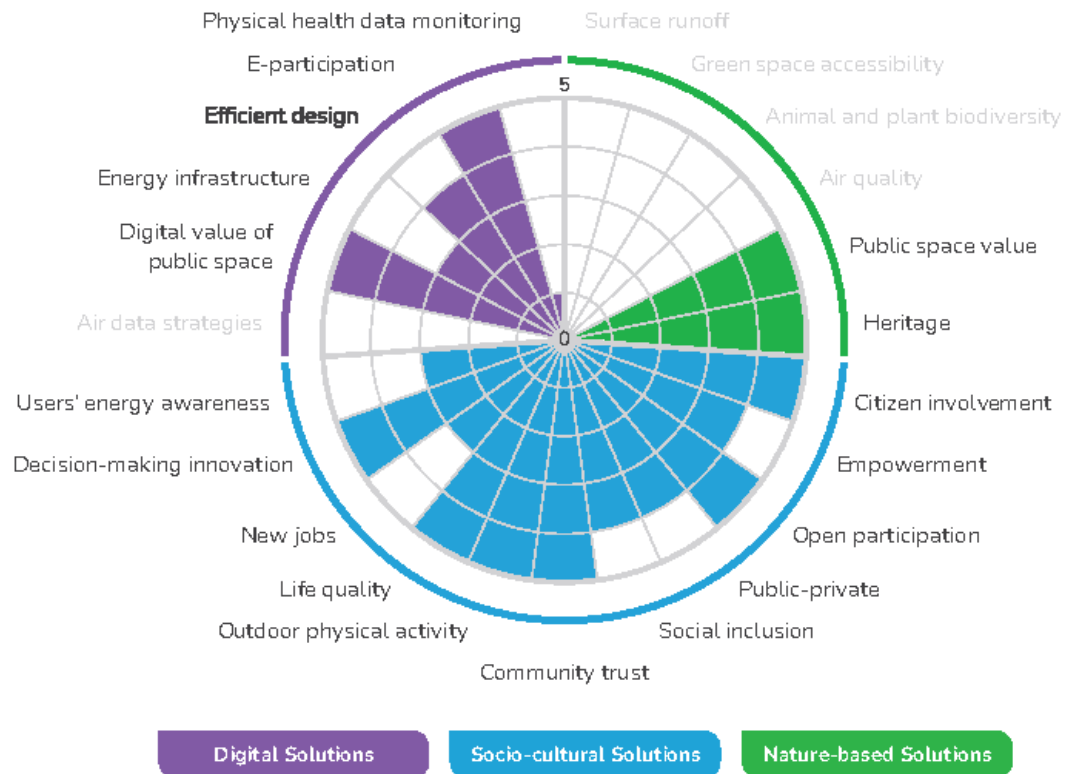


Figure 14: Dundalk Multiple Benefits Infographic 2

VISIONARY SOLUTIONS DUNDALK - Group 10

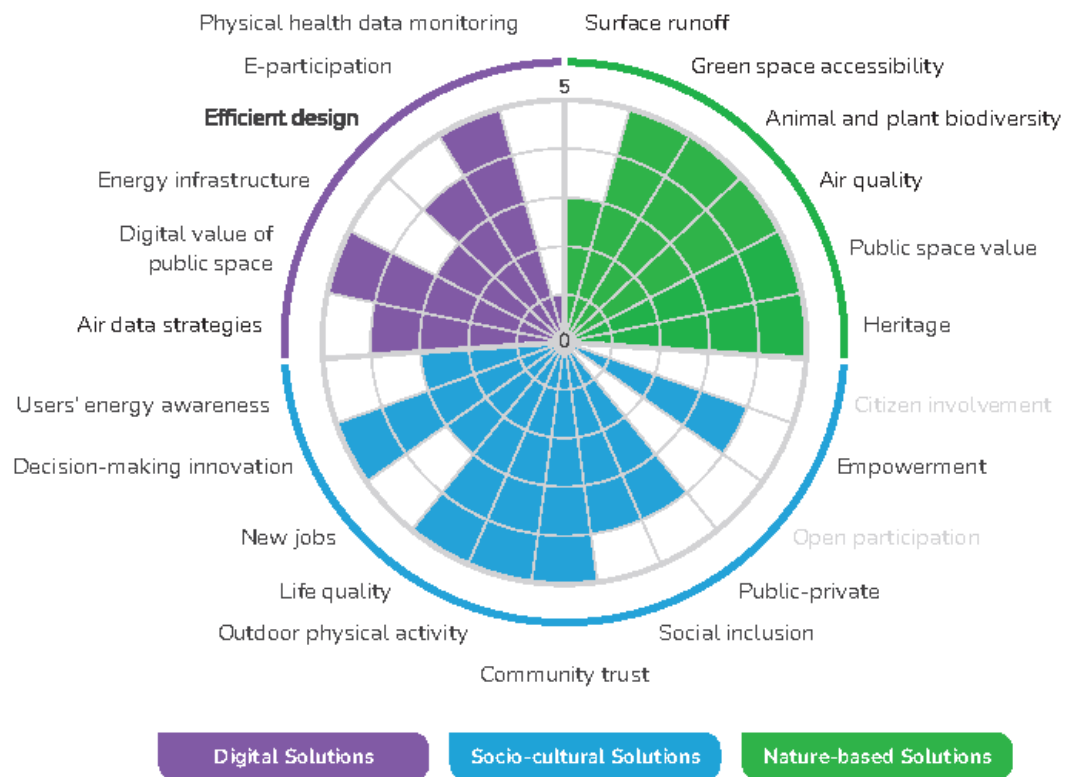


Figure 15: Dundalk Multiple Benefits Infographic 3

VISIONARY SOLUTIONS DUNDALK - Group 11

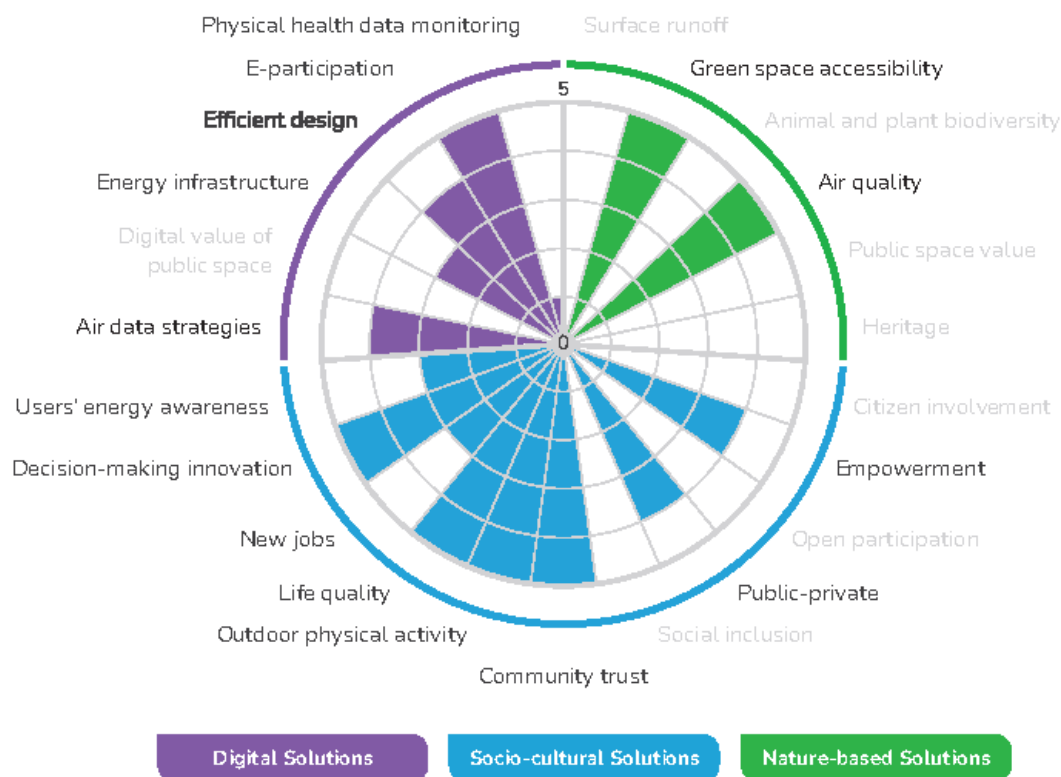


Figure 16: Dundalk Multiple Benefits Infographic 4

3.4 - Gżira Roadmap

Strategic Vision

Overall, this pilot's vision is to demonstrate visionary solutions in dense urban areas through micro-greening interventions and citizen science. A particular application of citizen science was in the use of sensors across the city by directly involving citizens through hosting the sensors as well as through an appreciation of the data that is generated.

Replication Pathway

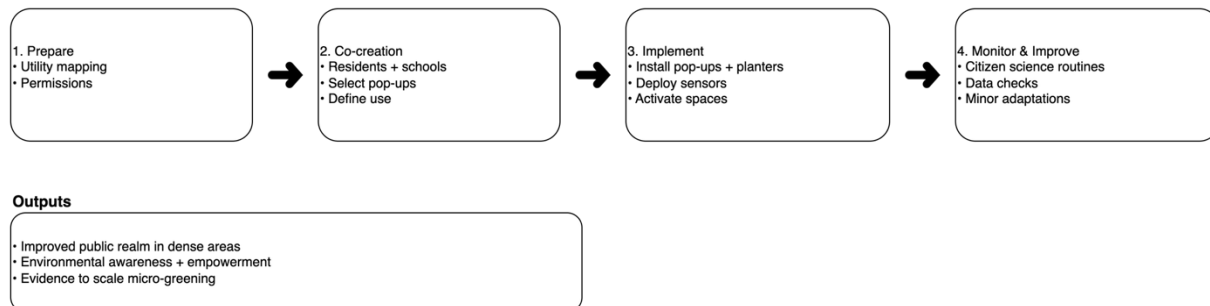


Figure 17 - Replication pathway for Gzira.

Milestones and Indicative Timeline

A typical indicative timeline on this type of intervention and visionary solutions is provided in Figure 18.

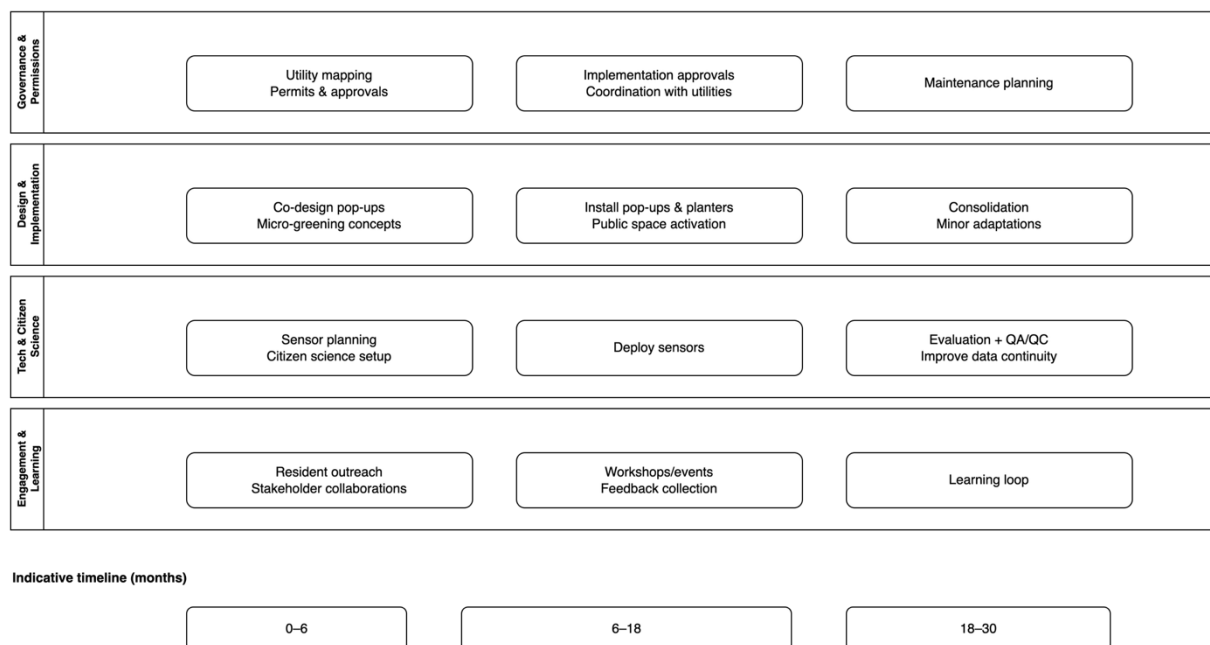


Figure 18 - Hypothetical replication timeline similar for interventions similar to the Gzira pilot.

Resources Required

The resources that are required for these sort of implementations include:

- Community facilitators
- Modest capital for sensor implementations



- Modest capital for micro greening interventions
- Networking infrastructure such as Lorawan gateways
- Maintenance budget of micro-greening interventions
- Maintenance budget of sensor network

Dependencies and Preconditions

The dependencies and preconditions include:

- Planning authority clearance for infrastructural works such as greening in schools
- Resident acceptance
- Connectivity

Key Risks and Mitigation Measures

Table 4 - Risks and mitigation measures related to interventions similar to those done in Gzira.

Risk	Mitigation
Procurement delays	Prioritise the procurement process as early as possible
Resident resistance	Use transparent and early engagement
Technical issues with sensors	Prepare a maintenance plan and a maintenance budget

Gzira Multiple Benefits Analysis

This subsection outlines the various benefits realised in Gzira, including environmental enhancement, educational initiatives, and strengthened social cohesion. The pilot assessed the main benefits, noting that natural solutions such as carbon storage and biodiversity improvement had a limited impact due to restricted implementation. However, increasing access to green spaces and their recreational value showed more promise. Social benefits were most evident in areas such as citizen empowerment, inclusion and strengthened community ties, with new participatory processes in local governance being highly rated. In economic terms, job creation was mainly temporary, with minimal influence on new business development or health outcomes. In terms of digital initiatives, air quality monitoring and e-participation platforms were successful; however, noise monitoring and health tracking relied on limited data and questionnaires, suggesting a need for more robust measurement

approaches



Credits: Eurac Research

Figure 19: Gzira Multiple Benefits Infographic 1

VISIONARY SOLUTIONS GZIRA - Group 3

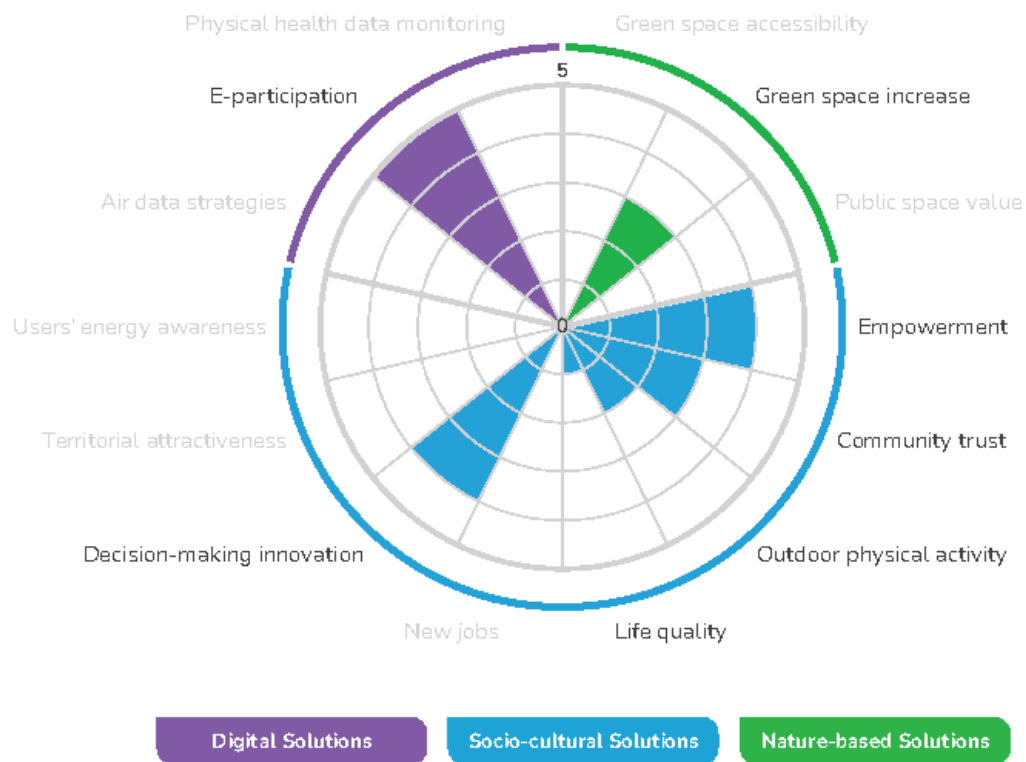


Figure 20: Gzira Multiple Benefits Infographic 2

VISIONARY SOLUTIONS GZIRA - Group 4

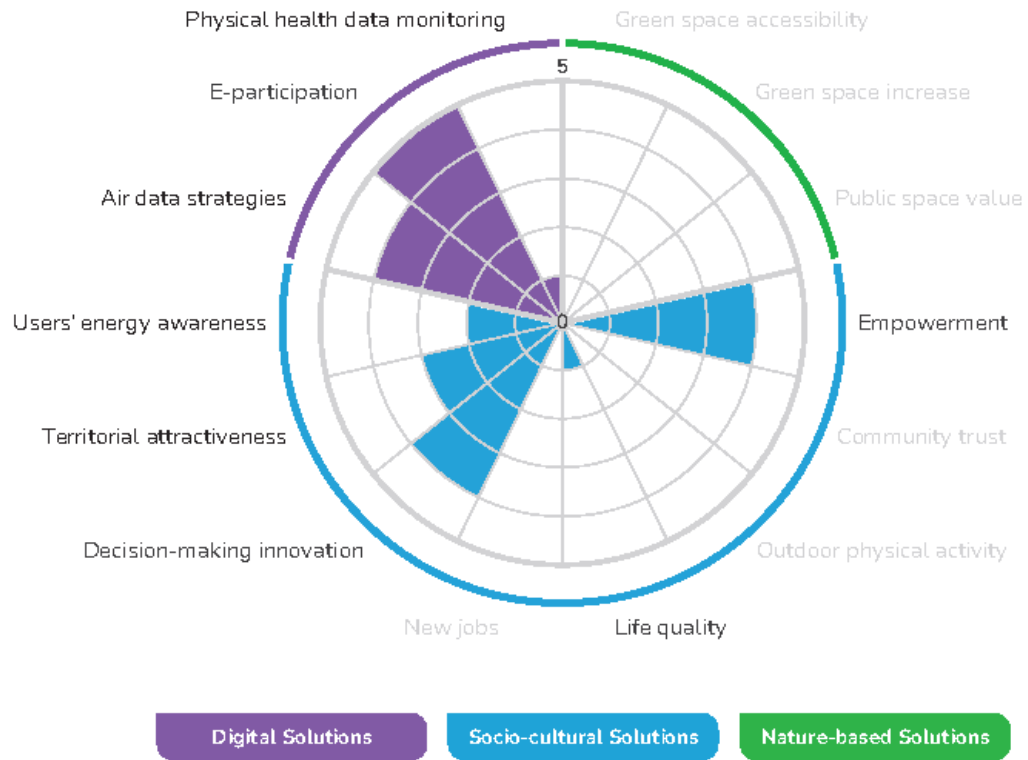


Figure 21: Gzira Multiple Benefits Infographic 3

VISIONARY SOLUTIONS GZIRA - Group 5

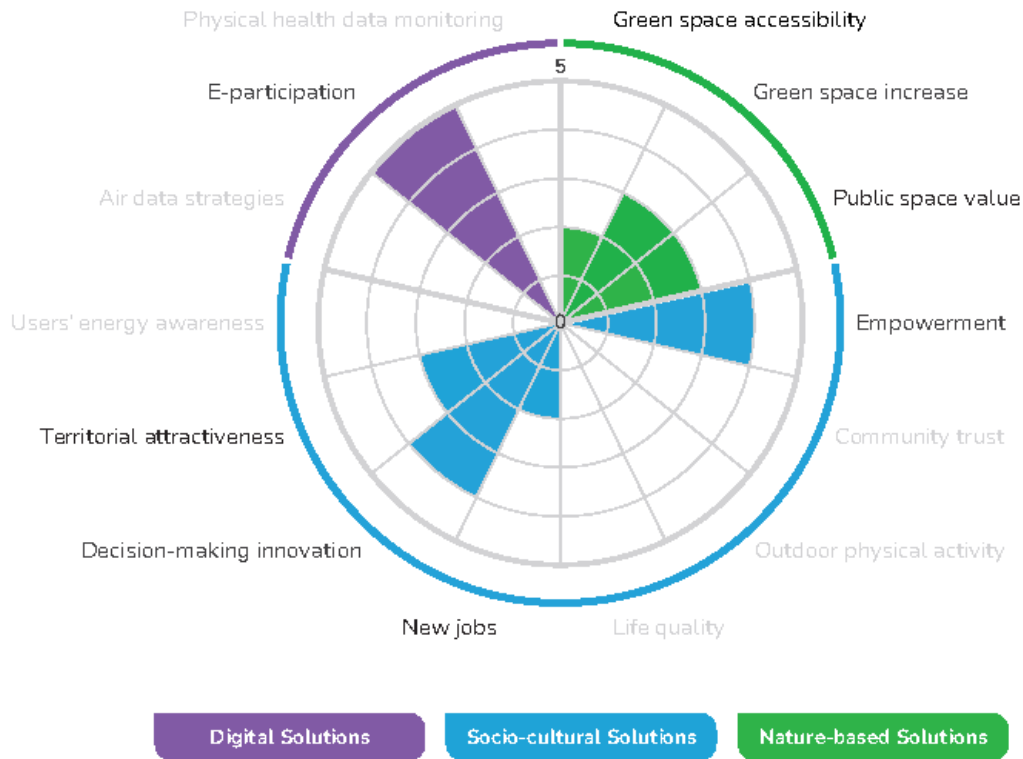


Figure 22: Gzira Multiple Benefits Infographic 4

3.5 - Leuven Roadmap

Strategic Vision

The strategic vision of the Leuven pilot interventions include solutions within large urban regeneration projects.

Replication Pathway

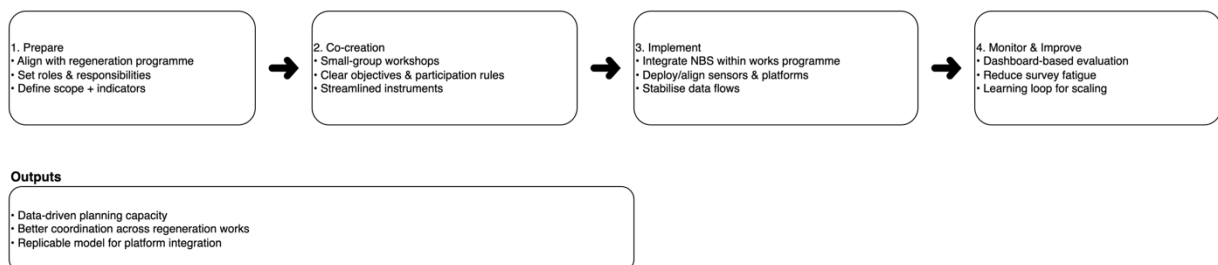


Figure 23 - Replication pathway for Leuven.

Milestones and Indicative Timeline

The milestones and indicative timeline for an intervention similar to the Leuven pilot is found in Figure 24.

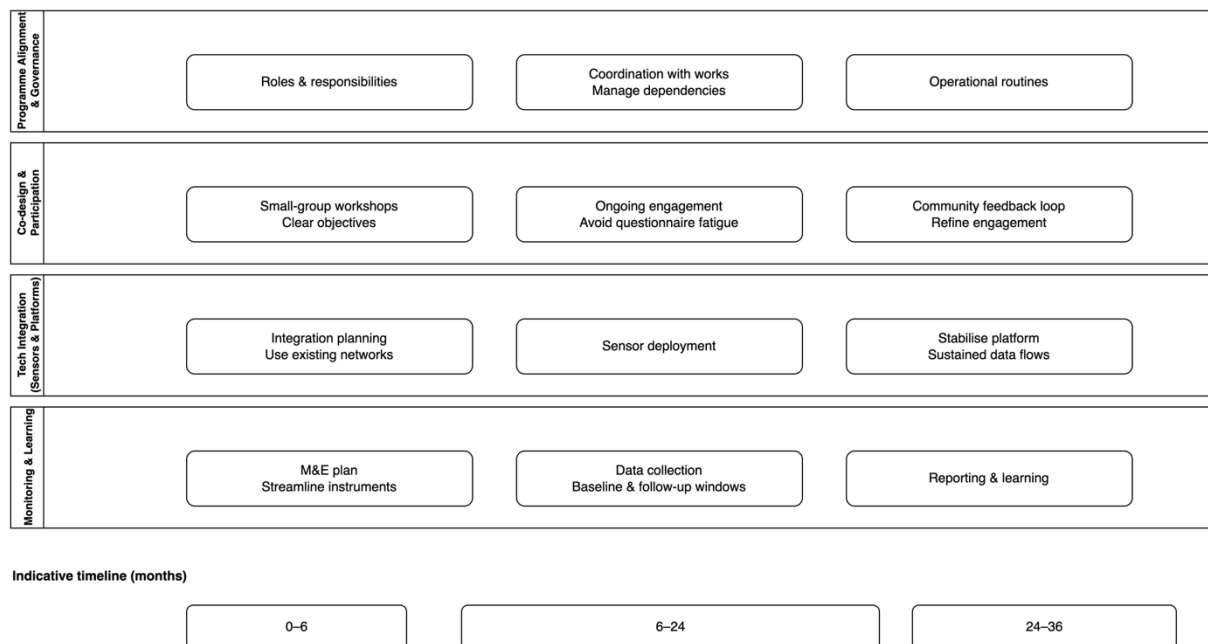


Figure 24 - Hypothetical replication timeline similar for interventions similar to the Leuven pilot.

Resources Required

The resources that are required for these types of visionary solutions include:

- Expertise in project management
- Data network infrastructure
- Maintenance schedules

Dependencies and Preconditions

The dependencies for such projects includes:

- Permitting from planning authorities
- Good community engagement

Key Risks and Mitigation Measures

Table 5 - Risks and mitigation measures related to interventions similar to those done in Leuven.

Risk	Mitigation
Survey fatigue	Maintain engaging types of workshops/events/activities
Permitting delays	Prepare early especially when it comes to co-design and planning application.
Technical issues with monitoring	Plan ahead and use contingencies on both hardware as well as budget.

Leuven Multiple Benefits Analysis

This subsection summarises the multiple benefits delivered by Leuven's interventions, including environmental regeneration and green space management at the Olevodroom. As can be seen from the graph, this provided a wide set of strong social benefits as well. Digital technologies were used to experiment with water and air quality sensors, which contributed to monitoring pollutant levels.



Credits: Eurac Research

Figure 25: Leuven Multiple Benefits Infographic 1

VISIONARY SOLUTIONS LEUVEN - Group 14

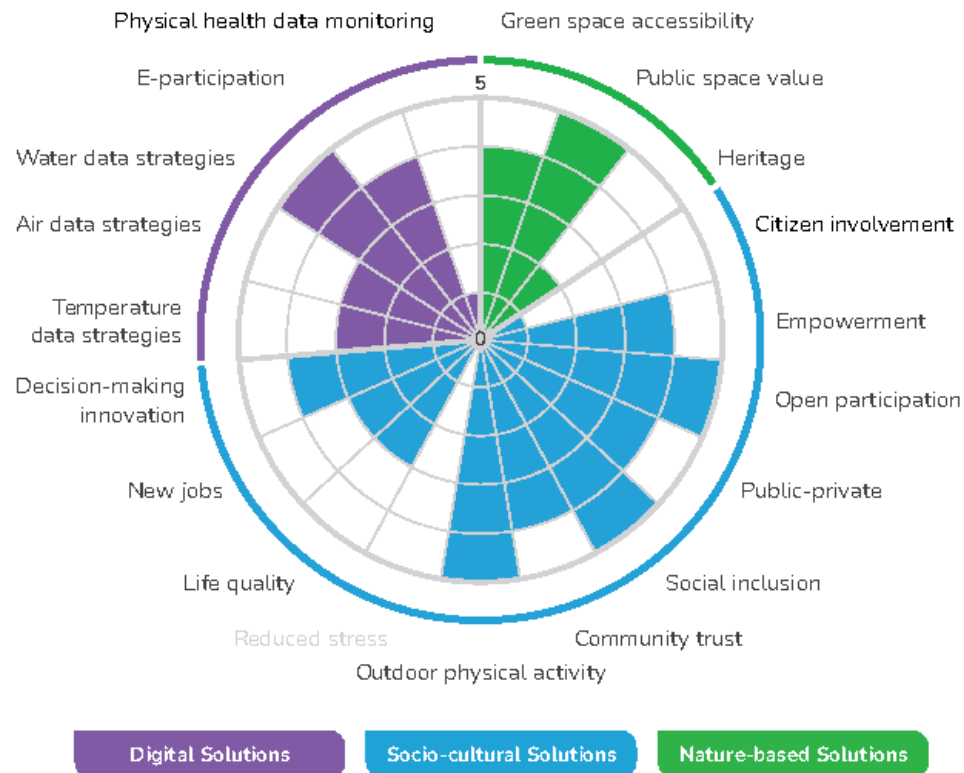


Figure 26: Leuven Multiple Benefits Infographic 2

VISIONARY SOLUTIONS LEUVEN - Group 15

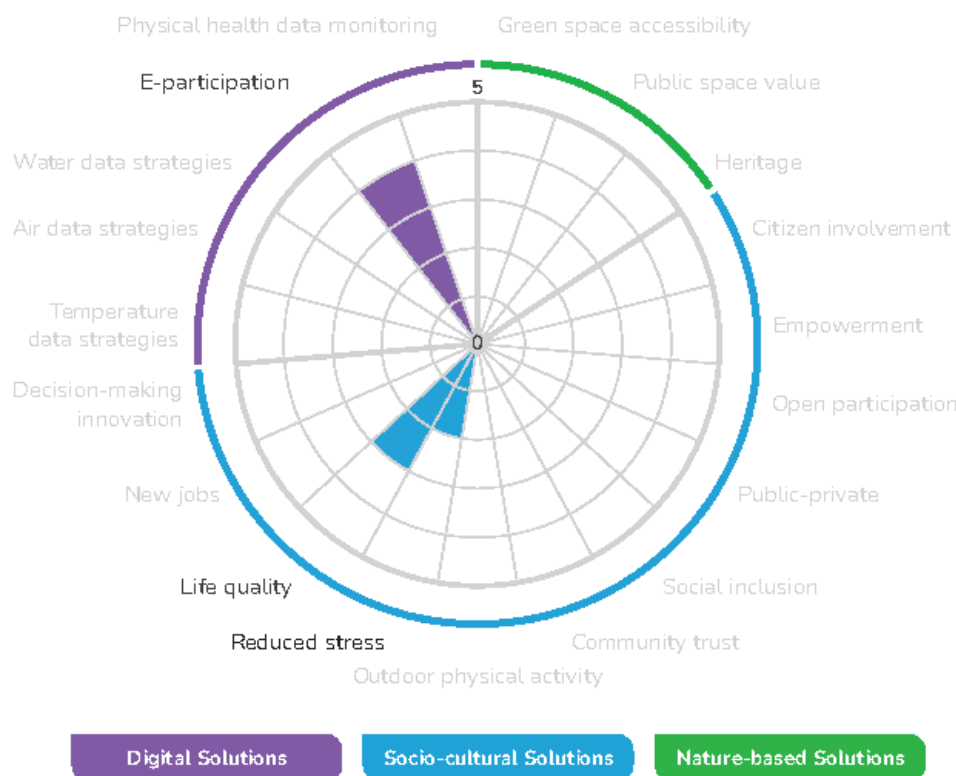


Figure 27: Leuven Multiple Benefits Infographic 3

3.6 - Novo Mesto Roadmap

Strategic Vision

Novo Mesto's vision is to transform a brownfield site into recreational green space that has inclusive and therapeutic benefits. Underused land can thus become a multifunctional park that is intended to provide users with the possibility to improve health, physical activity and encourage community interaction. This enables a replicable model to be created thus directing cities to combine site remediation with participatory design.

Replication Pathway



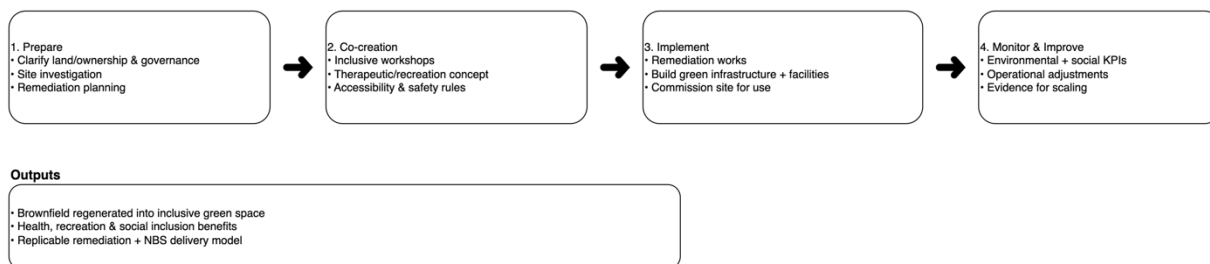


Figure 28 - Replication pathway for Novo Mesto

Milestones and Indicative Timeline

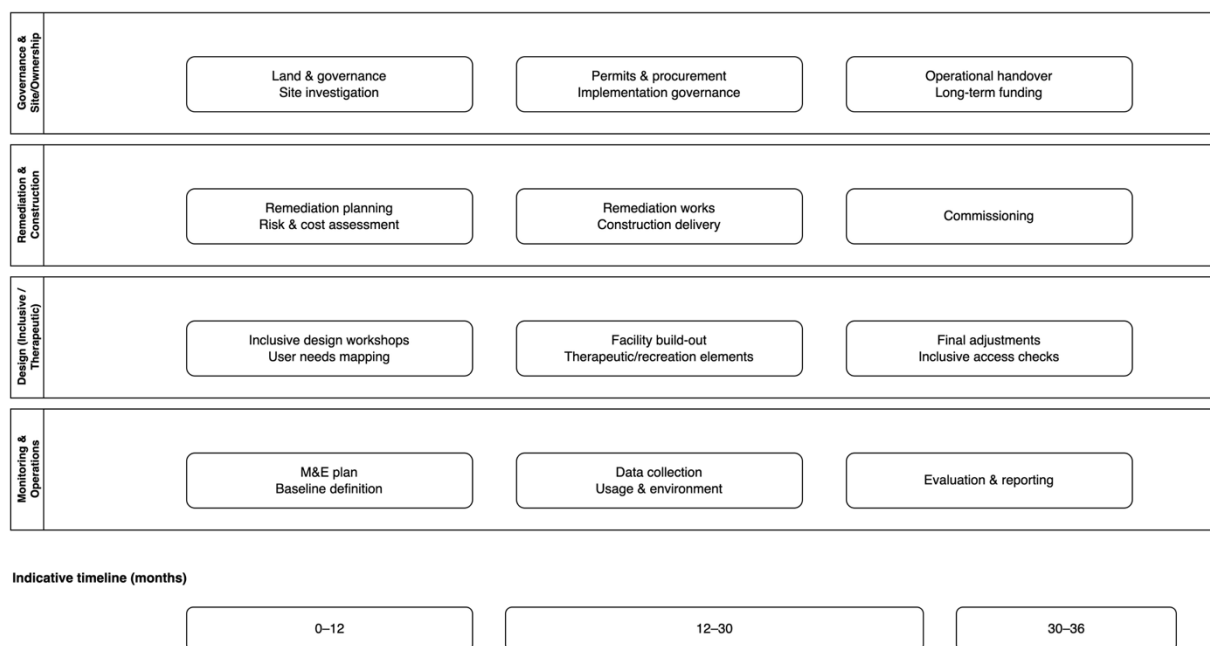
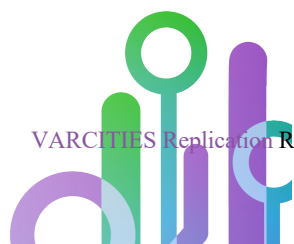


Figure 29 - Hypothetical replication timeline similar for interventions similar to the Novo Mesto pilot.

Resources Required



The primary resources required for these types of interventions include

- Sufficient land area
- Capital investment
- Site accessibility
- Maintenance and administration human resources as well as budget

Dependencies and Preconditions

The following dependencies and preconditions can also be noted:

- Identification of the extent of the intervention
- Capital and maintenance budget
- Planning and public engagement

Key Risks and Mitigation Measures

Table 6 - Risks and mitigation measures related to interventions similar to those done in Novo Mesto.

Risk	Mitigation
Delays in procurement	Initiate procurement process early and ensure good market research
Engagement difficulties	Organise special events and opportunities for the community to get the know about the development
Administrative difficulties	Plan administrative structures as early as possible.

Novo Mesto Multiple Benefits Analysis

This subsection presents the multiple benefits identified through the interventions, illustrating their broader impact beyond the primary objectives, including social, environmental and health-related gains. During the multiple benefits meeting, participants evaluated the benefits of various projects, initially focusing on environmental impacts such as carbon storage and reducing the effects of heat waves. Although tree planting was considered to be more symbolic in certain areas, green spaces were found to be highly effective in reducing temperatures and providing accessible recreational areas. Digital tools were recognised as a means of improving public awareness and infrastructure management, although some are still in the development stage. The discussion also emphasised the social and cultural advantages, including educational programmes for children, inclusive planning and activities that support



biodiversity. Efforts to make spaces accessible for people with physical or visual impairments were also praised. It was found that infrastructure for recreation enhances both physical activity and quality of life, with monitoring tools helping to manage visitor experiences. The economic aspects centred on job creation linked to pilot projects; however, the direct impact of some solutions was limited by regulatory factors. Collaboration between partners and institutions was considered vital for sustaining progress. Finally, the group emphasised the importance of data-driven strategies, such as using sensors to monitor air quality and temperature. Real-time information was shared via interactive platforms, helping both researchers and the public to better understand and benefit from the implemented solutions.



Credits: Eurac Research

Figure 30: Novo Mesto Multiple Benefits Infographic 1

VISIONARY SOLUTIONS NOVO MESTO - Group 16

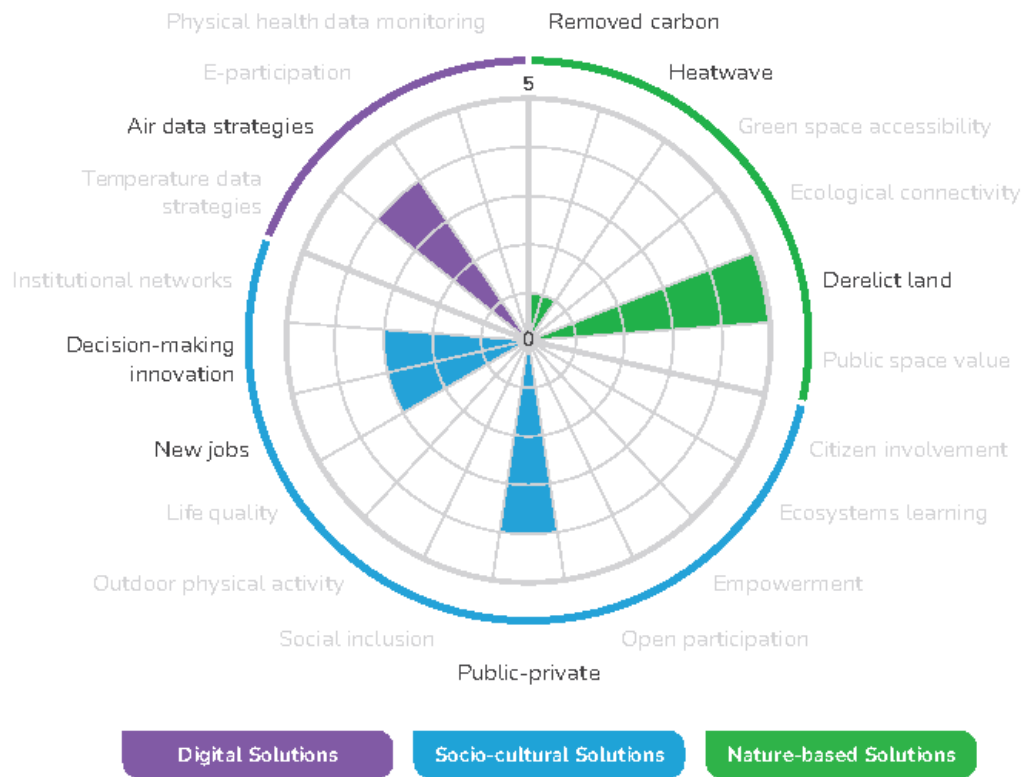


Figure 31: Novo Mesto Multiple Benefits Infographic 2

VISIONARY SOLUTIONS NOVO MESTO - Group 17

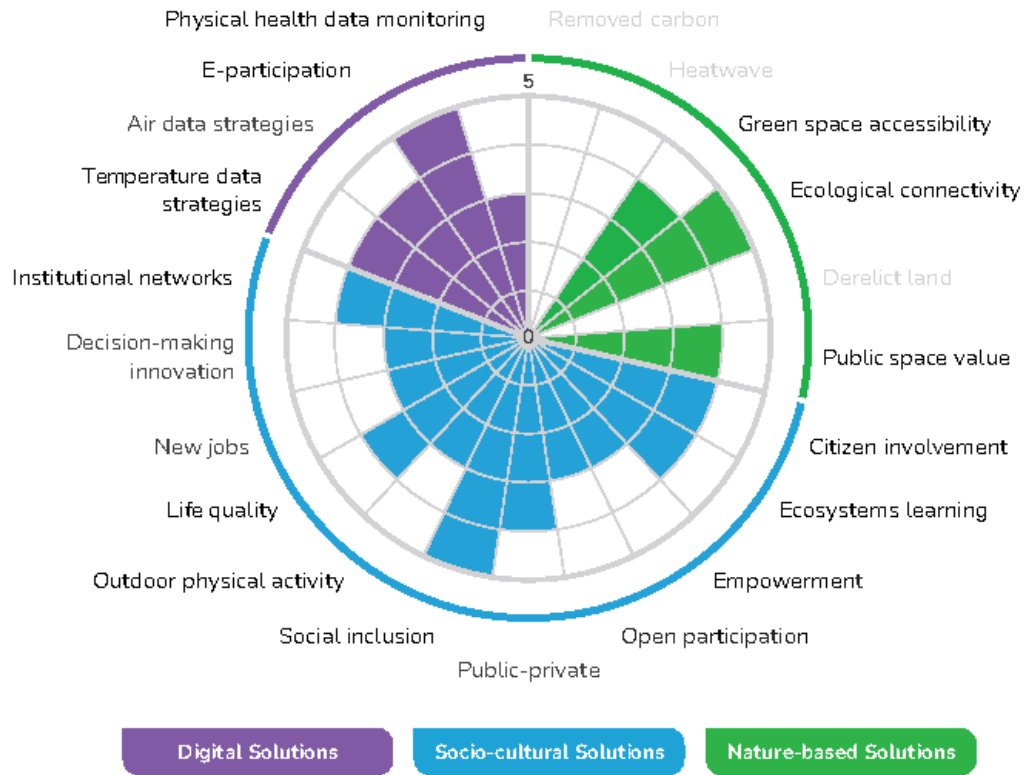


Figure 32: Novo Mesto Multiple Benefits Infographic 3

VISIONARY SOLUTIONS NOVO MESTO - Group 18

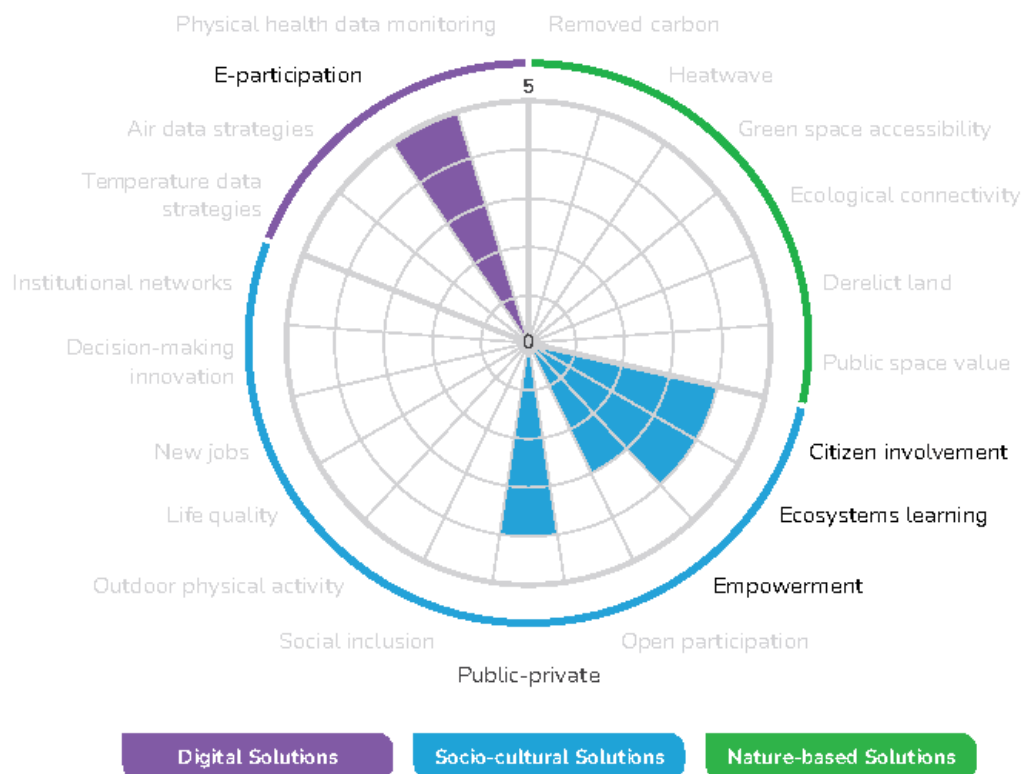


Figure 33 Novo Mesto Multiple Benefits Infographic 4

3.7 - Skellefteå Roadmap

Strategic Vision

Skellefteå's vision is to demonstrate how blue-green infrastructure and smart technologies can enhance liveability, safety, and resilience in cold-climate urban environments. By transforming a former landfill area into a residential and educational district, the pilot integrates climate-adapted design, smart lighting, and nature-based solutions suited to extreme seasonal conditions.

Replication Pathway



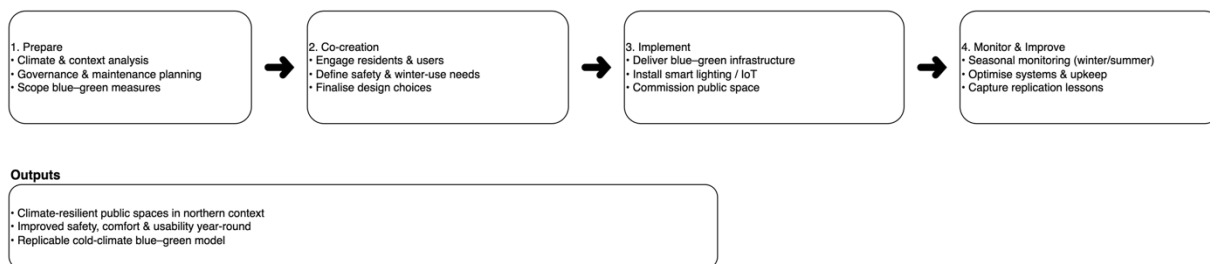


Figure 34 - Replication pathway for Skellefteå

Milestones and Indicative Timeline

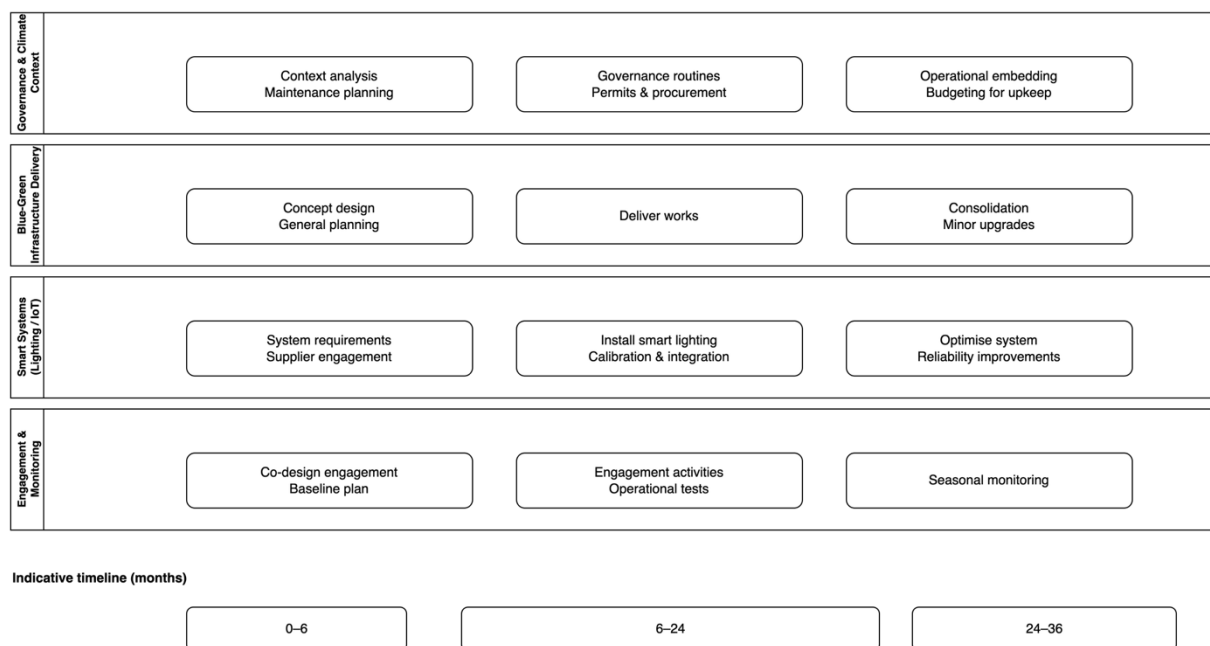


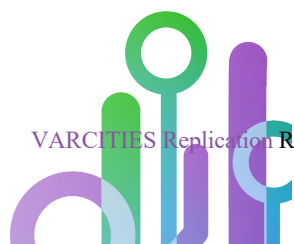
Figure 35 - Hypothetical replication timeline similar for interventions similar to the Skellefteå pilot.

Resources Required

The following resources can be identified from this pilot:

- Climate-adapted design expertise
- Digital systems

Dependencies and Preconditions



Key Risks and Mitigation Measures

Table 7 shows a couple of possible risks and mitigation strategies that can be found in a pilot similar to that of Skellefteå

Table 7 - Risks and mitigation measures related to interventions similar to those done in Skellefteå.

Risks	Mitigation
There is a risk that extreme weather affects implementation	Climate-adapted design solutions
There is a risk of increased maintenance requirements	Define maintenance responsibilities early

Skelleftea Multiple Benefits Analysis

This subsection outlines the various benefits delivered in Skellefteå, such as enhanced environmental education, increased biodiversity and stronger social cohesion. The discussion focused on the positive impact of various environmental and community projects. Participants emphasised the gains in biodiversity and improved water quality, as well as the advantages of engaging local communities, particularly through schools and workshops. They also reviewed public-private partnerships, enhancements to recreational spaces and well-being, and the increasing use of smart energy solutions and digital tools. While challenges remain in measuring health benefits, engaging diverse groups and assessing long-term costs, collaborative efforts and digital participation are widely recognised as valuable for the success of sustainable projects.



Credits: Eurac Research

Figure 36: Skellefteå Multiple Benefits Infographic 1

VISIONARY SOLUTIONS SKELLEFTEÅ - Group 6

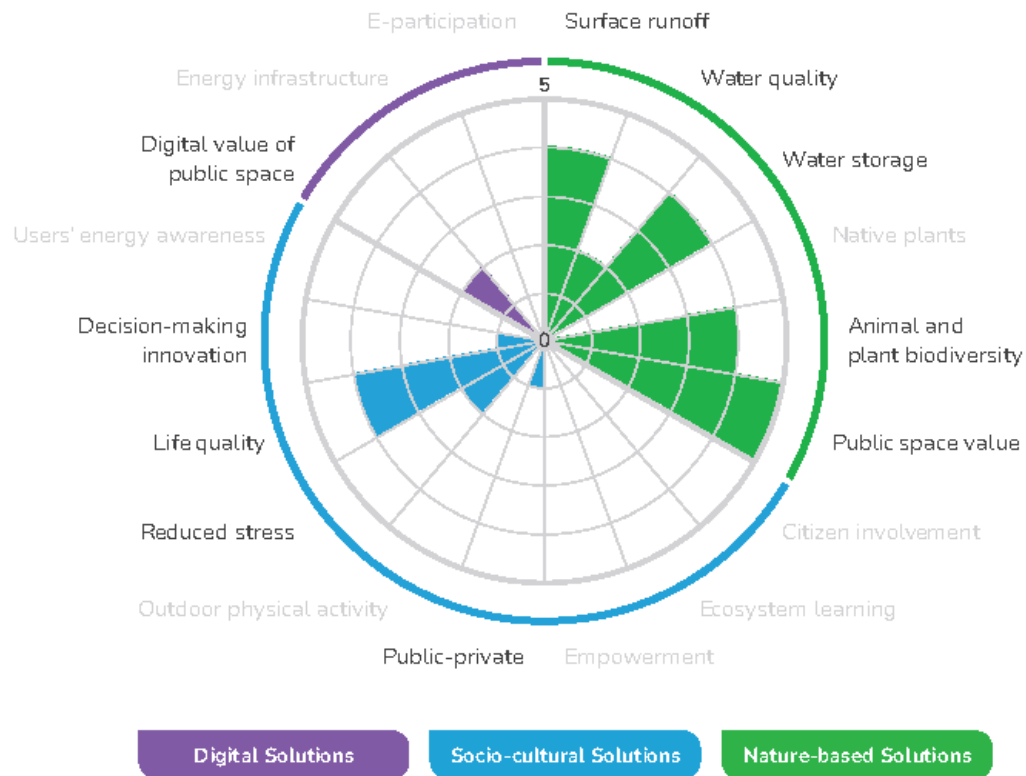


Figure 37: Skellefteå Multiple Benefits Infographic 2

VISIONARY SOLUTIONS SKELLEFTEÅ - Group 7

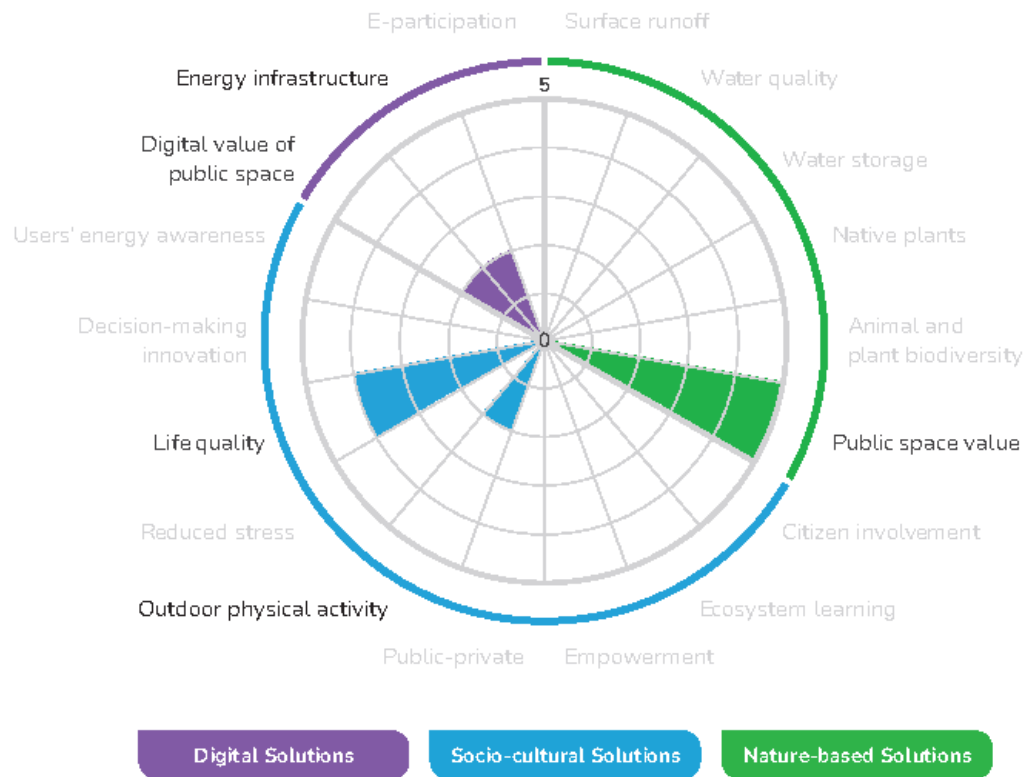


Figure 38: Skelleftea Multiple Benefits Infographic 3

VISIONARY SOLUTIONS SKELLEFTEÅ - Group 8

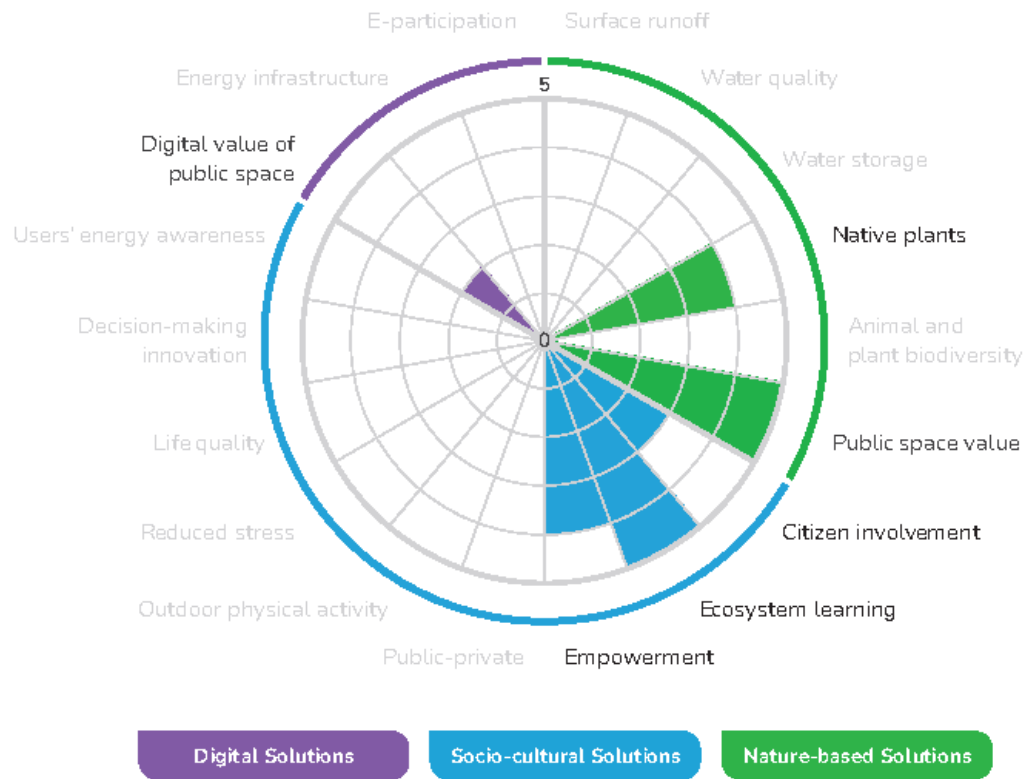


Figure 39: Skellefteå Multiple Benefits Infographic 4

4 VS Replication Potential & Upscaling Opportunities

This section analyses the replication potential of Visionary Solutions across different pilot cities. It presents survey results and expert feedback to identify opportunities for scaling these solutions in other urban contexts.

VARCITIES also explored how easily each solution could be scaled up or replicated. The Toolkit includes the results of a Replication Potential survey conducted for each city, asking: “how would you rate the replicability of the presented solution(s)?” on a scale of 1-5 as the main tool for measuring replicability. The main target audience of this data included academics, municipality and public authority representatives, comprising over 60 respondents at the Final GoGreenRoutes conference in Brussels. Other responses were gathered from city-to-city exchanges between the VARCITIES pilot cities and their partner cities, encompassing over 20 partners across Europe. Upscaling opportunities were additionally collected from pilot site representatives, together with WP8 leaders (INLE), as a collaboration to identify future plans and mechanisms to upscale or replicate their solutions.

The replicability ratings found throughout this work need to be treated with caution by any replication cities. The particular conditions that pertain to every city may be unique and these ratings might not apply universally but should only be used as a rough guidance to provide a solid starting point on any proposed visionary solution.

4.1 - Castelfranco Replication Potential

This subsection analyses the replication potential of Castelfranco’s Visionary Solutions. It considers the overall specific conditions of Castelfranco’s case-study, including heritage restrictions and particular co-creation practices, and evaluates how these can be adapted to other cities with similar or different urban challenges.

This analysis considers the replication potential of Castelfranco’s Visionary Solutions within the context of the city’s specific conditions, such as heritage restrictions and co-creation practices. It assesses how these solutions could be adapted for other cities facing similar or different urban challenges.



VS1: Blue and green areas for citizens' H&WB

The replication potential for this solution is viewed positively. The majority of respondents rated its replicability as high (21 responses), with moderate replicability as the second most common response (18 responses).

- Replicability Ratings (% of 50 total responses):
 - Not replicable at all: 2%
 - Low replicability: 12%
 - Moderate replicability: 36%
 - High replicability: 42%
 - Highly replicable: 8%

VS2: Analysis and monitoring of psychological and physiological WB for elderly & people affected by Alzheimer

Survey responses indicate a divided perception regarding this solution's scalability and transferability. It received an equal number of votes for low and moderate replicability (19 responses each). The monitoring of vulnerable populations raises significant privacy and ethical questions. The legal and regulatory frameworks governing data collection and use vary significantly between countries and even municipalities.

- Replicability Ratings (% of 53 total responses):
 - Not replicable at all: 4%
 - Low replicability: 36%
 - Moderate replicability: 36%
 - High replicability: 17%
 - Highly replicable: 8%

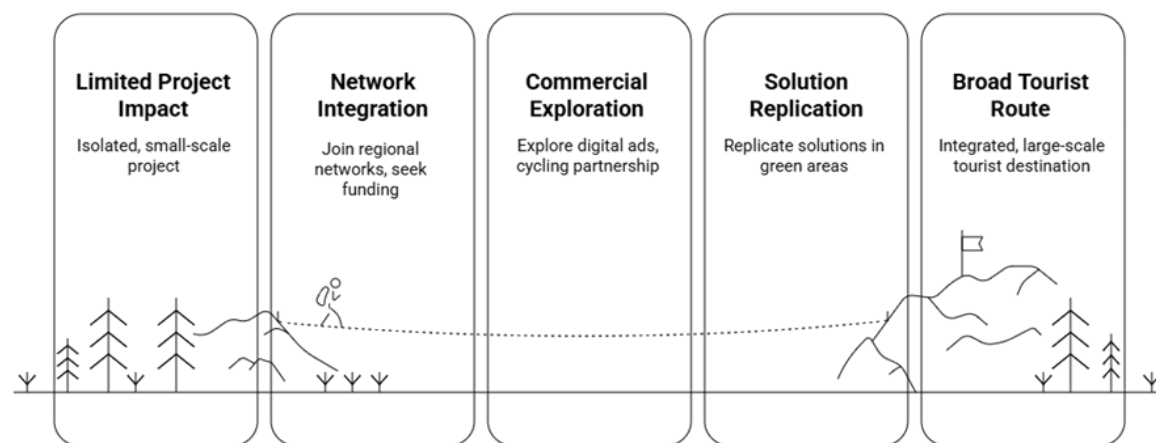


Figure 40: Castelfranco's Future Development

This report details the established plans for the continuity, upscaling, and replication of the Visionary Solutions (VS) implemented in the pilot city of Castelfranco Veneto within the framework of the VARCITIES project. The pilot's core activities centred on enhancing public health and well-being through the Garden of Villa Revedin Bolasco (VS1), fostering participatory

planning via the Observatory of the Landscape (VS4), and developing an integrated mobility network (VS5). The information herein is consolidated from direct consultation with key project partners from the Municipality of Castelfranco Veneto, EURAC and the University of Padua (UNIPD), outlining a clear and sustainable path forward for the solutions developed.

A robust foundation has been laid for the continuation of project activities beyond the official funding period. The physical infrastructures, including renewed pathways and specialized benches within the Villa Revedin Bolasco garden, are permanent installations that will continue to serve the public. Likewise, the environmental sensors procured for the project will be retained by the UNIPD for future research endeavours, and the interactive multimedia totem will remain fully operational. A cornerstone of the project's legacy, the Observatory on the Landscape, is secured for the long term through a new three-year programming period and the planned renovation of its future headquarters, the Barchessa degli Strepiti, which is funded by the Next Generation EU program and scheduled for completion by March 2026. To ensure the dissemination of knowledge, a comprehensive handbook detailing the project's research and results will continue to be distributed at relevant public and academic events.

The upscaling strategy leverages existing networks and future opportunities. The Observatory of the Landscape actively disseminates project outcomes through its membership in a regional network comprising fourteen other observatories, providing a direct channel for regional knowledge transfer. Building on the project's success, the municipality is exploring applications for additional funding to support initiatives for citizens with Alzheimer's disease and mild cognitive impairment, continuing its fruitful collaboration with UNIPD. The external pathway developed is envisioned as the first segment of a more extensive network connecting the city centre with surrounding areas. Maintenance of the physical infrastructure is guaranteed until at least 2030 through a formal plan managed by UNIPD, ensuring the durability of the project's tangible assets.

The project's solutions were designed with a primary focus on public benefit and civic value rather than commercial exploitation. Consequently, the project partners, as public and academic bodies, are generally restricted from engaging in profit-generating activities. However, a minor commercial potential has been identified in relation to the multimedia totem. This asset could potentially generate modest revenue through the rental of digital advertising space. It may also serve as a promotional platform for events or private companies whose missions align with the project's core themes of inclusivity and sustainable mobility. In this context, private sector interest has been noted from relevant companies, which focuses on cycling experiences and has engaged with the municipality following the totem's unveiling.

The solutions implemented in Castelfranco Veneto have demonstrated high replication potential in other urban and regional contexts. The core interventions, such as the installation of environmental sensors and the creation of thematic pathways in urban green spaces, are not dependent on a unique local context and can be readily adapted by other municipalities. Indeed, a primary mission of the Observatory is to first replicate these successes in other green



areas within Castelfranco itself before expanding further. Successful transferability to other regions is contingent upon several key enablers: strong institutional collaboration between technical and public partners, meaningful and sustained stakeholder involvement, and the securing of adequate funding. The project team has expressed a clear interest in participating as a developmental partner in future projects aimed at replicating these solutions in other European cities.

The long-term vision for the project's solutions involves deeper integration and technological enhancement. A primary goal is to incorporate the developed pathways into a larger network of touristic and pedestrian routes, replicating key facilities like the totem's charging station at other strategic locations. Should additional resources become available, the team would prioritize the expansion of the digital twin activities to create a more sophisticated virtual model of the park and villa, overcoming the technical limitations encountered during the project. Furthermore, additional funding would enable more intensive and overlapping data collection sessions, allowing for a richer, cross-disciplinary analysis between psychologists, neuroscientists, and environmental experts, an activity that was constrained by the COVID-19 pandemic. The role of citizens is considered fundamental to this future development, as their input is essential for evolving the solutions to meet community needs more effectively.

The project has established multiple channels for the ongoing dissemination of its results and experiences. Beyond the regional Observatory Network, findings will be showcased at an upcoming university event focused on well-being and green infrastructure. Community engagement is also facilitated through an annual city run that passes through the project site, with a promotional book for the event serving to highlight the project's achievements to a wide audience. The principal resource consolidating the project's knowledge is the official handbook, which functions as a comprehensive toolkit containing fact sheets, practical instructions, and narrative accounts of the solutions, thereby ensuring the project's learnings are accessible for future initiatives.

4.2 - Chania Replication Potential

This subsection evaluates the replication potential of Chania's pilot actions, focusing on the data-driven methodologies and co-creation models implemented. It highlights opportunities and constraints for transferring these solutions to cities with varying technical capacities and governance models.

This section evaluates the replication potential of Chania's pilot actions, with a focus on data-driven methodologies and co-creation models. It considers the opportunities and constraints for transferring these solutions to cities that have different technical capacities and governance models.

VS1: Mobile Urban Living Room (MULaR)

Results show a generally positive outlook for this solution's replicability, suggesting it is adaptable to various contexts despite potential barriers.

- Replicability Ratings (% of 64 total responses):
 - Not replicable: 3%
 - Low replicability: 11%
 - Moderate replicability: 34%
 - High replicability: 28%
 - Highly replicable: 23%

VS2: Sensor kits

This solution received a particularly high rating for its replication potential. A clear consensus exists on the feasibility of replicating this solution in other locations, with most participants rating it as highly or very highly replicable.

- Replicability Ratings (% of 54 total responses):
 - Not replicable: 6%
 - Low replicability: 2%
 - Moderate replicability: 11%
 - High replicability: 43%
 - Highly replicable: 39%



Figure 41: Scaling Mobile Urban Living Room

The municipality of Chania intends to continue both of its piloted solutions beyond the end of the VARCITIES project. The mobile urban living room (MULAR) has become a recognised element of public life, frequently requested by citizens and local organisations for use at community and cultural events - such as the city's Book Festival. The second solution, bike-mounted environmental sensors, is a small-scale, low-cost technology that can be easily affixed to any public bicycle. It has proven especially useful in Chania's tourism-driven context, where microclimatic conditions shift significantly from season to season. The municipality views the sensors as a valuable tool to capture environmental data over time.

Upscaling is envisioned in two main directions. First, there is strong interest in expanding collaboration with other municipalities that share similar health and well-being goals, potentially through joint projects. Second, the municipality hopes to diversify the thematic use of the MULAR by tailoring it to the needs of different social groups, such as older adults, people with disabilities, or youth groups. So far, the MULAR has primarily been used in cultural and environmental contexts, but the municipality is keen to explore new formats and target audiences in the future.

To support the continued operation of both solutions, Chania plans to draw on leftover project funds in the short term, while allocating municipal budget annually to cover maintenance, transport, and the replacement of sensors. Although a formal operational framework is still being developed, the municipality is already working on budgeting, management protocols, and rental procedures.

Commercial use is also being explored, primarily through rental models. A number of private and cultural actors, including a local cheese company and a dance collective, have expressed interest in using the MULAR. While the municipality does not intend to commercialise or franchise the solution in a formal sense, it recognises that rental revenues could help sustain the asset and allow broader access. Importantly, there are no legal or institutional barriers preventing such uses, and the municipality is actively exploring how to structure rental terms, transport costs, and responsibilities for users. One key requirement for broader uptake is the creation of a detailed user manual, enabling the MULAR to be operated independently without requiring municipal staff to be present at every event. Additional protocols are being drafted to ensure that use is secure and that the MULAR is returned in good condition, including insurance considerations and inspection forms.

Replication and transferability are seen as highly feasible. The MULAR's modular design allows users to adapt the elements to their needs, whether using it as a stage, a seating space, or a digital display, making it applicable in both urban and rural settings, including coastal areas. Some technical challenges, such as the safe transport of the unit, have already been addressed, and the municipality is willing to share its know-how with peers. There are no major contextual constraints limiting the solution to Chania; on the contrary, the team believes the MULAR could be replicated elsewhere with appropriate support. In future projects, the Chania team is open to acting as a replication partner and offering technical advice, particularly on the practical and administrative lessons learned.

The long-term vision is for the MULAR to become a co-managed public asset. While the municipality will maintain oversight and responsibility for logistics, it hopes to hand over increasing levels of autonomy to citizen groups and other users. This model, which blends public stewardship with citizen-led activation, is already being tested through event partnerships. Expanding accessibility, for instance by adding features that accommodate

elderly or people with limited mobility, is a clear priority for future development, along with smaller adjustments to improve daily functionality and maintenance.

A key takeaway from the pilot was the value of co-design. Unlike previous practices, where the municipality would design a solution and consult later, the VARCITIES pilot required the team to collaborate with citizens and stakeholders from the start. This participatory approach has since informed other urban planning initiatives in Chania, including a regeneration project on a former military site. While implementation was shaped by the unique challenges of the COVID-19 pandemic, the experience also fostered creativity and problem-solving under pressure.

Overall, the pilot exceeded expectations in terms of social impact. Although not originally conceived as a revenue-generating solution, the MULAR has become a symbol of civic life and community identity, and its popularity among residents is seen as a key measure of success. The municipality is already working on internal documentation, guidelines, toolkits, and protocols, to support future use and to share with other cities.

4.3 - Dundalk Replication Potential

This subsection presents the replication analysis for Dundalk's interventions. It explores how the city's approach to multifunctional green spaces and integrated energy solutions can be replicated or scaled in other European contexts, particularly mid-sized cities.

This section explores how Dundalk's interventions, specifically its approach to multifunctional green spaces and integrated energy solutions, can be scaled or replicated in other European contexts, especially in mid-sized cities.

VS1: Learning Pod

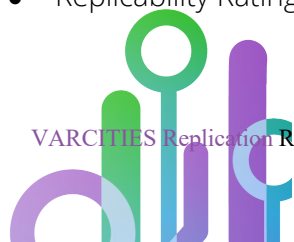
There is a perception of a positive potential for scaling up this solution. The majority of responses (20) placed this solution in the moderate replicability category, followed by high replicability (15).

- Replicability Ratings (% of 53 total responses):
 - Not replicable at all: 8%
 - Low replicability: 13%
 - Moderate replicability: 38%
 - High replicability: 28%
 - Highly replicable: 13%

VS2: Outdoor Urban Green Learning & Sensory Garden

This solution received strong support, indicating a consensus on its high potential for replication in other contexts.

- Replicability Ratings (% of 51 total responses, from chart):



- Not replicable at all: 2%
- Low replicability: 6%
- Moderate replicability: 25%
- High replicability: 33%
- Highly replicable: 33%

VS3: Bike stations with sensors and maintenance facilities

This solution was also viewed as highly replicable, showing a consistent belief in its adaptability and value.

- Replicability Ratings (% of 54 total responses, from chart):
 - Not replicable at all: 4%
 - Low replicability: 4%
 - Moderate replicability: 15%
 - High replicability: 39%
 - Highly replicable: 39%

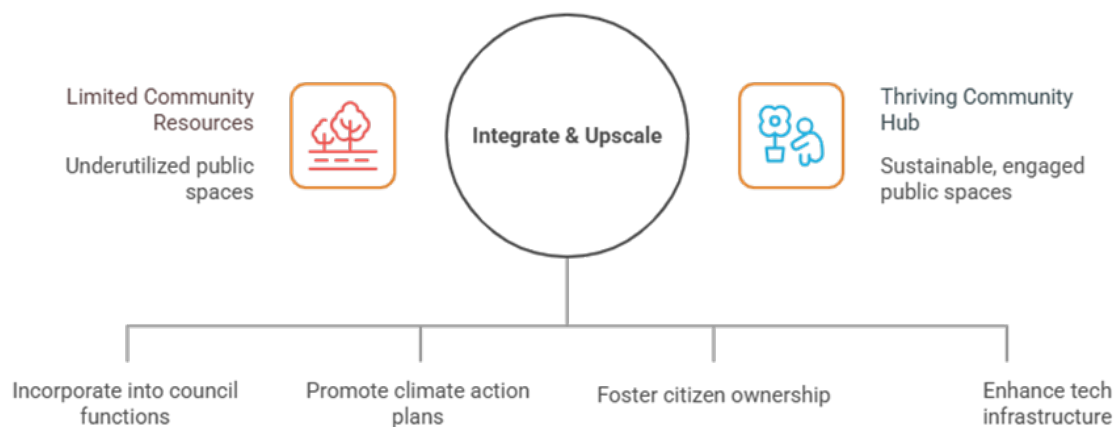


Figure 42: Dundalk's Sustainable Community Hub

This part summarizes the insights gathered from stakeholders regarding the replication potential, ongoing integration, commercial prospects, and future vision of the VEs in Dundalk. Central to the discussion were key assets such as the community gathering space, sensory garden, rainwater harvesting system, and the learning pod.

The public uptake of the Learning Pod, a gathering space, situated near the city centre and available free of charge through a booking system, has exceeded expectations. This space is predominantly utilized by older, retired residents but also attracts students and various community groups. Its appeal is further enhanced by adjoining features, including a sensory garden and a quiet seating area, which together create a calm and attractive public space which was previously a staff car park. An additional feature of the Dundalk Pilot site is a Sensory Cubbie located inside the library. This offers an immersive multi-sensory space that reduces anxiety and encourages participation. The sensory Cubbie has already been replicated by an

advocacy group. Other municipalities in Ireland have contacted LCC asking for an analysis of purchasing the Cubbie for the community, the region and the Local Authority.

Stakeholders agreed that this integrated model holds strong replication potential for other local authorities, particularly when positioned in active urban centres with significant foot traffic. The nature-based aspect, combined with the provision of a safe, aesthetically pleasing environment and passive surveillance, has proven critical to its success. Furthermore, the involvement of permanent council staff to manage the space, alongside an effective booking system, is essential for its ongoing viability. The project is already being showcased within regional networks, with interest from other councils considering adopting similar facilities as part of their staff wellbeing initiatives or community health programs.

In terms of continuity, the maintenance of the sensory garden has been successfully integrated into routine council operations. Maintenance, litter collection, and general upkeep are managed either by council staff or supplemented by volunteer organizations such as local Tidy Towns groups. This integration supports wider council goals on climate action and sustainability. Strong community ownership is evident, with local stakeholders actively participating in the upkeep and promotion of the site. This partnership has resulted in recognition through national awards, further boosting the town's reputation and fostering pride among residents.

While direct commercialization of the solutions is limited by the county council's non-profit mandate, there are emerging opportunities for small and medium enterprises to engage with the space. A nearby café expressed interest in serving visitors, and the location has attracted local musicians, art festivals, and the potential for seasonal markets. Nevertheless, commercialization faces constraints due to the council's remit, energy efficiency targets, and the need to ensure equitable access and fair competition.

Looking ahead, plans are underway to enhance the site with solar photovoltaic panels on the learning pod to offset increased energy use from heating, which was added following higher than expected wintertime usage. Improvements to technical infrastructure, particularly establishing a permanent wired internet connection to support interactive displays and data dashboards, are also priorities.

A major lesson learned from the project is the value of the extensive co-creation process, which spanned five years and involved multiple workshops. This approach fostered deep community ownership and integration, though stakeholders recognize that such a time-intensive process may not be practical for future replications given typical project timeframes and budgets. Local citizen groups, alongside voluntary organizations, will continue to play a vital role in activating and sustaining the space. The Dundalk project team is enthusiastic about supporting future replication or scaling efforts by offering advisory support and sharing their experience.

In conclusion, the VSs deliver a successful and replicable nature-based community solution that integrates gathering spaces, sensory gardens, and sustainability features to engage diverse populations. Its embedding within council operations and strong community partnerships are key enablers for long-term sustainability and upscaling. Although commercial opportunities are limited, the site supports a variety of ancillary activities that contribute to local vibrancy. Replication is recommended for similar urban centres with active community hubs, provided they ensure appropriate staffing, funding, and policy integration. Future developments focused on renewable energy and digital infrastructure will further enhance the solution's impact and sustainability.

4.4 - Gżira Replication Potential

This subsection reviews Gżira's replication potential, with particular attention to space-constrained urban areas. It discusses the transferability of temporary urbanism approaches, citizen science initiatives, and modular green infrastructure.

This analysis reviews Gżira's replication potential, focusing on its transferability to space-constrained urban areas. It covers temporary urbanism, citizen science, and modular green infrastructure.

VS1: Micro-greening and pop-up parks

There is strong confidence in this solution's scalability. It is primarily considered to have high replicability (23 responses), followed by very high replicability (18 responses).

- Replicability Ratings (% of 56 total responses):
 - Low replicability: 2%
 - Moderate replicability: 25%
 - High replicability: 41%
 - Highly replicable: 32%

VS2: Citizen Science on Air Quality to Increase Health & Well-Being Awareness

This initiative is seen as having high replicability, reflecting a consistently positive outlook.

- Replicability Ratings (% of 55 total responses, from chart):
 - Not replicable at all: 4%
 - Low replicability: 9%
 - Moderate replicability: 29%
 - High replicability: 38%
 - Highly replicable: 20%

VS3: Educational Community Garden / Art Playground

This solution's perceived potential for successful replication is high. It received 23 responses indicating high replicability, and 18 for very high replicability.

- Replicability Ratings (% of 58 total responses):
 - Not replicable at all: 2%



- Low replicability: 5%
- Moderate replicability: 22%
- High replicability: 40%
- Highly replicable: 31%

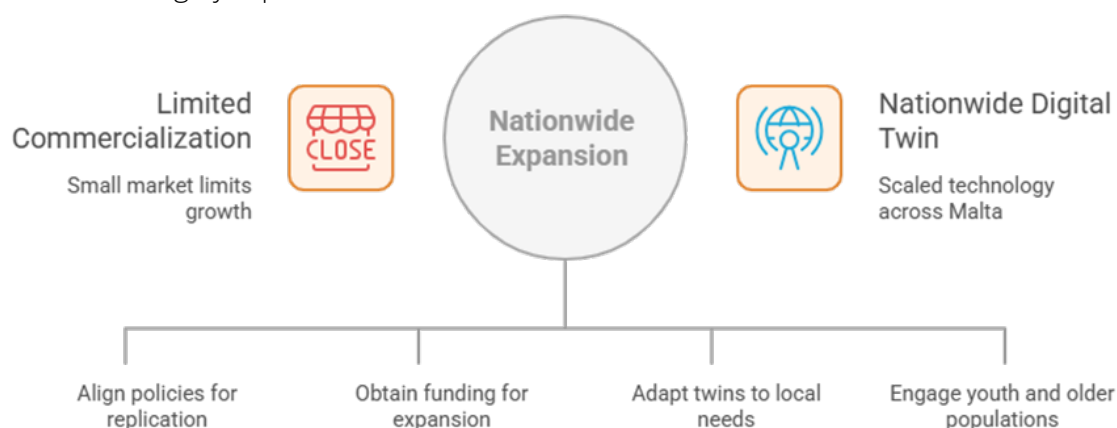


Figure 43: Scaling Digital Twin Technology

The Gżira pilot site has taken significant steps towards upscaling and replicating its solutions, positioning itself as a national and international reference for digital and climate adaptation innovation. Notably, Gżira is the only VARCITIES pilot currently developing a concrete Horizon Europe application, securing its continuity and embedding its outcomes into future EU-funded activities. Locally, the pilot has contributed to the development of a multilevel governance model that combines citizen co-creation at the municipal level, regional collaboration through aggregation of local initiatives, and national coordination with Malta's newly established Climate Action Authority. This bottom-up approach ensures that policy development is grounded in local realities while aligned with EU climate missions.

Although no direct commercialisation pathways have yet materialised, Gżira has initiated discussions with private sector actors, including insurance companies and banks, to explore the integration of corporate social responsibility mechanisms into climate adaptation funding schemes. SMEs and start-ups have shown interest in the solutions piloted, particularly the digital twin and smart transport elements, but remain cautious due to uncertainties about return on investment. The challenge of scaling climate innovations in small economies like Malta requires addressing risk management concerns and providing clearer investment recovery frameworks. In addition, the procurement of high-quality spatial data posed a barrier during implementation. The pilot team had to independently acquire detailed datasets from providers, highlighting the need for better data-sharing infrastructures to support future projects.

Replication efforts are already underway at the national level. The foundational digital twin developed in Gżira is being extended across Malta, as well as the Gozo region. This process includes the deployment of IoT devices, sensor networks, and AI-driven traffic management

systems, with a particular focus on intelligent transport solutions. Key enablers identified for successful replication include policy alignment with EU missions, secure funding streams, continuous technical capacity building, and sustained stakeholder engagement through co-creation. The experience also highlighted context-specific challenges, particularly in community acceptance. For example, a proposed extension of the project involving the redevelopment of a bus stop area into a green corridor was cancelled following strong opposition from local residents. This demonstrates the critical role of citizen participation and the need to balance innovation with local values in a democratic manner. Moreover, generational differences in climate engagement were identified as a key factor, with younger residents showing greater willingness to adopt sustainable behaviours, while older generations exhibited more resistance. This underscores the importance of tailored communication and education strategies targeting different demographic groups.

Looking to the future, Gżira's long-term vision extends beyond national replication, with ambitions to scale solutions across the EU27 and contribute to global digital transformation initiatives. The Climate Impact Simulator, developed over the past decade and tested within the VARCITIES framework, is now being positioned for EU-wide adoption. Furthermore, Gżira has initiated collaborations with international partners, including Japanese institutions, to exchange methodologies and jointly explore new applications of digital twin and climate modelling technologies. These developments have made Gżira a unique case study, demonstrating how small states can drive context-specific innovation.

Lessons learned from the Gżira pilot include the necessity of embedding co-creation throughout various stages, addressing generational engagement gaps, and ensuring access to high-quality data from the outset. The experience has also revealed the need for more integrated approaches to risk management and investment de-risking, particularly when engaging with the private sector. Moving forward, the team recommends that cities aiming to replicate similar solutions invest early in data infrastructure, prioritise stakeholder engagement, align local initiatives with national and EU policy frameworks, and develop clear strategies for financial sustainability. Dissemination efforts are ongoing, with the Gżira team actively participating in international climate forums and maintaining a strong presence in EU networks. While no specific toolkits or guidance documents have been developed beyond the VARCITIES deliverables to date, the pilot's outputs and methodologies continue to inform broader discussions on digital transformation and urban resilience both within Malta and internationally.

4.5 - Leuven Replication Potential

This subsection examines Leuven's replication potential, focusing on digital-physical integration and active mobility promotion. It highlights lessons for cities interested in combining environmental monitoring with participatory urban regeneration.



VS Group 1: (Mobile) Urban Living Room & data collection

This solution was largely perceived as moderately replicable (34 responses), indicating it is adaptable depending on the specific context.

- Replicability Ratings (% of 73 total responses):
 - Not replicable at all: 1%
 - Low replicability: 18%
 - Moderate replicability: 47%
 - High replicability: 23%
 - Highly replicable: 11%

VS Group 2: IoT infrastructure for smart lighting & noise measurements

This solution demonstrates a high potential for replication and is widely seen as scalable. The majority of responses rated it as highly replicable (32) or very highly replicable (16).

- Replicability Ratings (% of 70 total responses):
 - Not replicable at all: 3%
 - Low replicability: 10%
 - Moderate replicability: 19%
 - High replicability: 46%
 - Highly replicable: 23%

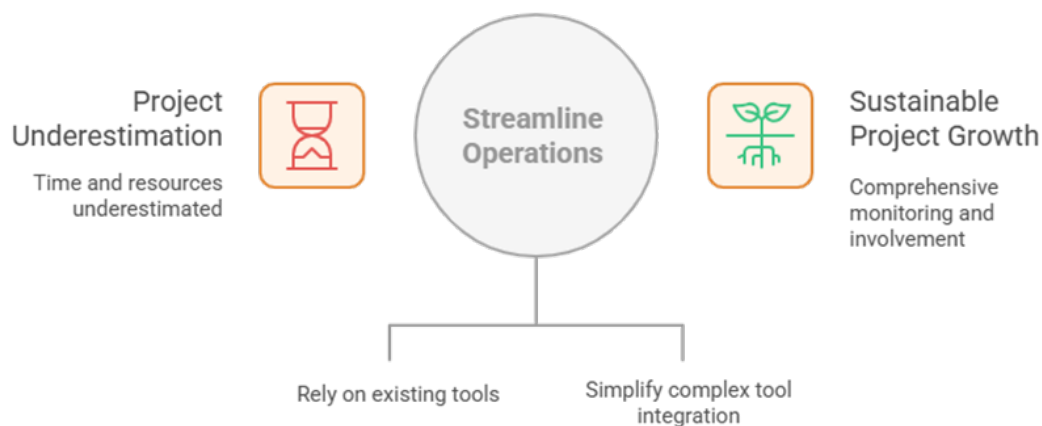


Figure 44: Scaling Leuven's Olevodrome Project

Several VEs in Leuven will continue beyond the project's end. The Olevodrome, a temporary structure used for cultural, social, and sports programming, will remain in place until the planned performing arts centre is built on the site. The city will also continue sound monitoring through smart light poles and extend microclimate and heat monitoring as part of other European-funded research projects.

There are currently no concrete plans to upscale or extend the VSs within Leuven or to other regions. While the idea of relocating the Olevodrome was once considered, it is now expected to remain on-site until decommissioned.

Ongoing activities are supported through contributions from five city departments, which co-funded the continuation of Olevodrome programming post-project. Heat and microclimate monitoring will continue under other EU-funded projects. Sound monitoring contributes to the city's mandatory Noise Action Plan under EU law, providing an institutional framework for continuity and future funding opportunities.

Leuven does not currently foresee commercial exploitation of its solutions. The municipality is not positioned to commercialize the Olevodrome due to operational complexity and staffing limitations, although resale or circular reuse may be explored if it is dismantled. Some commercial interest was noted from other cities and organisations, but no formal plans are in place. One commercial outcome was the collaboration between two companies (Schreder and Unisense) that developed a smart sound and light solution influenced by the pilot solutions.

The digital solutions (sound and microclimate sensors) are considered replicable in other cities, especially those addressing similar urban heat island or noise challenges. However, key enablers include funding, technical expertise, and adequate operational capacity. The Olevodrome's artistic and site-specific nature limits its direct replication, although the approach, using bottom-up participatory methods to activate temporary spaces, is transferable.

The Olevodrome serves as a testbed for future community-led programming in the new performing arts centre. While the structure itself is temporary, its role in informing long-term participatory planning is essential. Citizen involvement in scheduling and programming is seen as essential to long-term success.

The pilot relied heavily on bottom-up community programming and will continue this participatory approach in the development of the future performing arts centre. Citizen involvement in scheduling and programming is seen as essential to long-term success.

The city regularly participates in inter-city knowledge exchange and intends to continue sharing insights from the Leuven pilot site through these informal networks, particularly around themes such as NBS, heat stress, noise pollution, and participatory planning.

Key lessons include underestimating the operational and managerial demands of temporary public space activation and the complexity of integrating multiple digital systems. Recommendations for future replication include minimizing reliance on new or external technologies, leveraging existing municipal tools, and accounting for extensive time and resource needs for coordination and digital communication. Cities are advised to design solutions that are as autonomous and robust as possible.



4.6 - Novo Mesto Replication Potential

This subsection analyses the potential for replicating Novo Mesto's forest trail systems, smart monitoring, and inclusive design processes. It provides insights into how cities with natural landscapes or peri-urban zones can adapt these solutions.

This section analyses the potential to replicate Novo Mesto's forest trail systems, smart monitoring, and inclusive design processes, offering insights for cities with natural landscapes or peri-urban zones.

VS Group 1: Brownfield remediation & greening

There is strong confidence in the scalability of this solution. The majority of respondents rated it as having high (19 responses) or very high replicability (16 responses).

- Replicability Ratings (% of 39 total responses):
 - Low replicability: 5%
 - Moderate replicability: 5%
 - High replicability: 49%
 - Highly replicable: 41%

VS Group 2: Inclusive design of recreational & therapeutic facilities

This solution has a generally positive perception, with some variation. Responses were led by high replicability (17 responses), followed closely by moderate replicability (16 responses).

- Replicability Ratings (% of 50 total responses):
 - Not replicable at all: 4%
 - Low replicability: 10%
 - Moderate replicability: 32%
 - High replicability: 36%
 - Highly replicable: 18%

VS Group 3: Integrated management of facilities

The view of this solution's replication potential is balanced yet favorable. Responses were concentrated around high replicability (17 responses) and moderate replicability (15 responses).

- Replicability Ratings (% of 49 total responses):
 - Not replicable at all: 8%
 - Low replicability: 12%
 - Moderate replicability: 31%
 - High replicability: 35%
 - Highly replicable: 14%

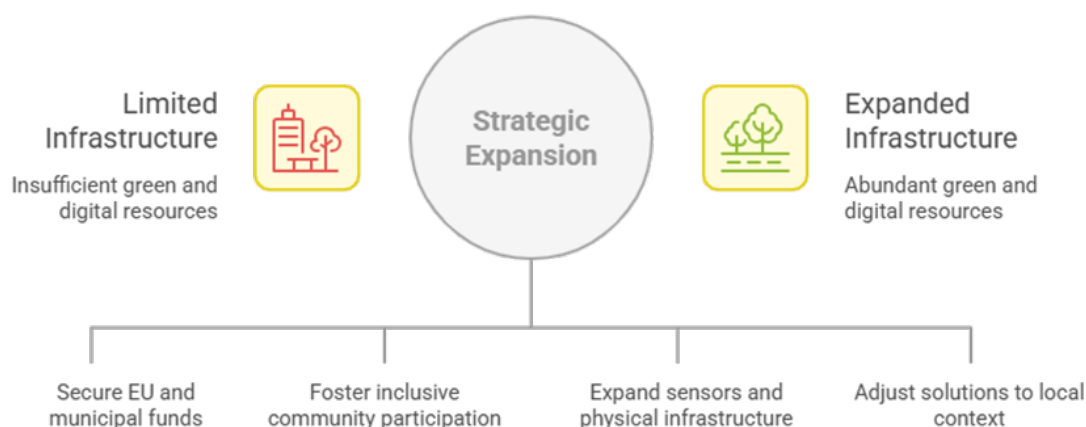


Figure 45: Expanding Green and Digital Infrastructure

Following the conclusion of the VARCITIES project, the Municipality of Novo Mesto confirmed that all implemented Visionary Solutions will continue beyond the project's end, with several already being upscaled through new funding and initiatives. The greening of a former brownfield site (VS1), for example, will not only be preserved but also expanded. This is being achieved through a newly funded project under the Community-Led Local Development (CLLD) programme, which secured €120,000 to extend access from the recreational centre to the Natura 2000 area. The local recreational centre, managed by a public body owned by the municipality, is responsible for the ongoing maintenance and management of this green infrastructure, ensuring its long-term sustainability.

Similarly, the physical activity infrastructure (VS2), including a trim trail and exercise stations, will remain publicly available. Plans are in place to enhance these facilities further by adding a new area for physical exercise by the end of the year. These investments have been well received by the community and continue to support public health objectives.

The digital and IoT infrastructure established under VS3 is also set to continue, as the municipality has launched a public procurement process to ensure technical support for the IoT platform beyond the project's lifetime. This platform, which monitors environmental quality and user behaviour, will also form the backbone of future digital transformation projects in the city, with potential for additional funding through other European Commission mechanisms.

A particularly innovative outcome of the project is the development of an ICT-based management system (VS4) for predicting and communicating occupancy levels at facilities such as the swimming pool and velodrome. The logic and algorithms behind this system are now being explored for application in other municipal contexts, including urban mobility. Additionally, wearable devices for activity monitoring (VS5) are now permanently available at the recreational centre, free of charge, and accessible to individual users and organised groups alike.

Novo Mesto has also initiated technology upscaling beyond the original scope of the project. Based on successful pilot tests of machine vision systems for monitoring movement within the recreational park, the city has recently completed a procurement process for seven additional devices. These will be deployed in other urban areas to support citywide monitoring and planning.

A notable indirect outcome of the project has been the attraction of private sector interest. Plans are underway for a private investor to develop a campsite within the recreational area, an initiative made viable by the increased public use of the site generated through VARCITIES. The campsite is expected to complement municipal infrastructure by offering accommodation for visiting groups and recreational tourists.

The solutions implemented in Novo Mesto exhibit strong replication potential, both conceptually and technically. The nature-based interventions, such as the greening of public spaces and development of exercise infrastructure, are particularly transferable. Their replication depends more on shifting community and administrative mindsets, toward recognising nature as an asset in urban development, than on specific technical requirements. These interventions can be adapted to various local contexts, with some adjustment to the natural landscape and community needs.

Digital solutions such as the IoT monitoring platform and the occupancy management system are also replicable in medium-sized cities, provided there is sufficient technical capacity and a basic digital infrastructure. Importantly, Novo Mesto has already begun supporting replication by sharing spatial masterplans and knowledge with interested cities from Slovenia, Croatia, Portugal, Montenegro, and North Macedonia. These exchanges were facilitated through the European Urban Initiative (EUI), DG NEAR, and other networks, further illustrating the city's commitment to knowledge sharing and cross-border learning.

For successful replication of Novo Mesto's solutions in other municipalities, several enabling conditions must be in place. First and foremost, sufficient technical capacity is necessary to maintain digital platforms, manage IoT devices, and analyse collected data. Access to funding, both for initial investments and ongoing maintenance, is also critical. Equally important is strategic alignment within municipal governance structures, particularly the recognition of nature-based solutions as drivers of sustainable urban development. As noted by project stakeholders, many municipalities still struggle to reconcile environmental protection with urban growth. A shift in perception, positioning natural infrastructure as an enabler of community well-being, is often required.

While many elements of the solutions are widely transferable, certain aspects, particularly those related to the physical setting, are context specific. For instance, the forested landscape in Novo Mesto enabled the development of a trim path through natural terrain. This type of intervention would require adaptation in cities with different geographic features, such as lakeside environments. Therefore, while conceptual replication is highly feasible, each city must tailor



implementation to its natural and urban context.

Novo Mesto sees VARCITIES not as a one-off project but as a foundation for long-term development. The municipality is actively translating both the technologies and the institutional capacities built during the project into other areas of city planning and governance. One such example is the ongoing redevelopment of the city's historic National Home building, where the co-creation methodologies used in VARCITIES are being replicated to ensure participatory decision-making.

The municipality has also attempted to secure additional EU funding, including Horizon Europe proposals focused on dynamic mobility monitoring. Although initial applications were unsuccessful, the city remains committed to pursuing future opportunities. If additional resources were available, the municipality would have prioritised expanding its sensor network and developing new recreational facilities rooted in natural surroundings. These ambitions demonstrate a clear and ongoing commitment to both technological innovation and sustainable urban living.

Reflecting on its experience, Novo Mesto emphasised several key lessons for other cities seeking to adopt similar solutions. Most importantly, replication efforts should not involve copying solutions directly. Instead, municipalities must fully understand the context in which they operate and adapt solutions accordingly. This is particularly important for nature-based solutions, which must be grounded in the specific environmental, social, and spatial realities of each location.

The city also highlighted the importance of citizen involvement. Building infrastructure alone is not sufficient; proactive engagement with users is necessary to ensure long-term use and impact. Programming, communication, and partnerships with local groups are essential to animate the space and sustain momentum. As one official put it, “Build it, and they will come” is a myth; success requires active effort to bring people into the area and keep them engaged.

Finally, Novo Mesto is committed to continuing its role as a contributor to replication efforts beyond the VARCITIES project. While no additional toolkits or resources are currently in development, the municipality remains open to collaboration and peer exchange, particularly through European networks and future projects focused on scaling up sustainable urban solutions.

4.7 - Skelleftea Replication Potential

This subsection evaluates the replication potential of Skellefteå's water management and outdoor learning interventions. It addresses how cities with similar climatic or environmental conditions can adapt and implement these nature-based and educational solutions.

This subsection assesses the potential to replicate Skellefteå's water management and outdoor learning interventions, addressing how cities with similar conditions can adapt them.



VS Group 1: Natural Infrastructure to increase resilience in blue spaces

This solution was most frequently rated as having moderate replicability, while a considerable number of responses indicated it is not replicable. Blue space (rivers, lakes, coastlines) has unique ecological characteristics. The natural infrastructure solutions for a subarctic river in Skelleftea, for instance, would be designed to address specific issues like ice jams, spring melts, and local biodiversity. These solutions are not directly transferable to a Mediterranean coast or a temperate river system, which face different challenges like drought, erosion, or different types of flooding.

- Replicability Ratings (% of 59 total responses):
 - Not replicable: 27%
 - Low replicability: 22%
 - Moderate replicability: 41%
 - High replicability: 10%
 - Highly replicable: 0%

VS Group 2: Smart Lighting

There is a cautious view of this solution's scalability. It is predominantly seen as having low replicability (24 responses), followed by moderate replicability (18 responses). This is mainly tied to the site-specific nature of the solution. Skelleftea is in a subarctic climate with long, dark winters and significant snowfall. A Smart Lighting solution here is highly customized to counteract these extreme conditions.

- Replicability Ratings (% of 61 total responses):
 - Not replicable: 25%
 - Low replicability: 39%
 - Moderate replicability: 30%
 - High replicability: 0%
 - Highly replicable: 7%

VS Group 3: Open air educational infrastructure

The majority of respondents (23) placed this solution in the low replicability category, with non-replicable (16 responses) being the second most frequent response. The design of open-air infrastructure is highly dependent on the local landscape, including topography, existing vegetation, and proximity to natural features. What works in the specific landscape of Skelleftea may not be applicable to a dense urban and public space.

- Replicability Ratings (% of 62 total responses):
 - Not replicable: 26%
 - Low replicability: 37%
 - Moderate replicability: 19%
 - High replicability: 13%
 - Highly replicable: 5%





Figure 46: Project impact ranges from local to widespread adoption.

The Skellefteå team confirmed that all the implemented solutions from the VARCITIES project would remain in use beyond the project's conclusion. The water management interventions (VS1 and VS2), including improved waterways and a constructed wetland bed, are long-term measures that will be maintained without the need for additional work. Similarly, the innovative lighting solutions will continue to be maintained in their current form. The only uncertain element is the environmental sensors (VS3), as this park is currently the only one in Skellefteå equipped with them. The municipality is exploring ways to keep them active for a limited period, but their long-term operation depends on further evaluation and whether similar deployments occur in other parks.

While there are no concrete plans yet for upscaling, the city sees strong potential, particularly with the outdoor classrooms. These have garnered significant interest from other parks and have proven benefits for educational engagement and biodiversity awareness. The parks department is now aware of their value, and it is likely that similar installations will be considered in future park renovations or redesigns.

Funding has already been secured to maintain the current solutions through the city's maintenance plans. Any future expansions would go through Skellefteå's ordinary budget planning process. This approach is consistent with other cities in the project. Although no formal operational or institutional frameworks have been developed specifically for VARCITIES outputs, the project has strengthened collaboration between departments, particularly between parks, water and wastewater, and municipal management. This improved coordination has made it easier to engage in joint funding opportunities and EU project

applications, thanks to better internal networks and understanding of how externally funded projects work.

Skellefteå does not see commercial potential in the implemented solutions, as they are part of public, tax-funded services. However, there has been collaboration with external actors such as the regional Science Centre, a semi-independent non-profit organisation. The centre supports school use of the outdoor classroom by facilitating educational activities. They operate a voluntary booking system to avoid scheduling conflicts, but use of the space remains open and free to the public, with no formal sponsorships or financial arrangements required.

In terms of replication, Skellefteå is confident that most of its pilot solutions are transferable to other contexts. This has been reinforced by positive feedback during study visits from other cities. While some water-related elements depend on specific site conditions (e.g. presence of water bodies), other components like the outdoor classrooms and artistic lighting concepts are widely replicable. Feedback on these interventions has been particularly positive.

Key enablers for replication include sufficient funding and effective cross-departmental collaboration. Skellefteå highlighted the importance of having facilitators, people who bridge departments and help identify common goals, as critical to the project's success. The VARCITIES project team played this facilitating role, making interdepartmental work more fluid and efficient. During study visits, this facilitation was repeatedly pointed to as a best practice.

Although the implemented solutions are adaptable to different environments, some context-specific adjustments are required, such as aligning with local flora and fauna. For instance, if these solutions were transferred to a coastal park, the focus would shift from forest ecosystems to shoreline biodiversity.

The team expressed clear interest in participating in future replication or upscaling initiatives. The solutions developed in VARCITIES are seen as contributing directly to Skellefteå's goal of becoming climate neutral by 2030, a target set through the Swedish Mission Cities initiative (Viable Cities). Thus, the project outcomes are part of a broader long-term strategy.

If additional resources were available, Skellefteå would focus on expanding outdoor classrooms into smaller villages within the municipality to ensure more equitable access. They would also aim to build a standardised network of environmental sensors and develop a permanent IT infrastructure to host interactive park information online. Discussions on these developments have already begun with the IT and organisational development departments.

Looking ahead, Skellefteå envisions citizens playing a greater role, not just in co-creation but also in the long-term care of public spaces. One pilot activity underway this summer incentivises

the public to remove invasive plant species, even offering small payments for participation. The team hopes to deepen this kind of participatory process.

Skellefteå intends to continue sharing its experiences through Swedish networks such as Viable Cities and others. The most important lesson learned from the project was the need to involve stakeholders early and often. The team found that engaging such a diverse group, ranging from retired individuals to working adults and schoolchildren, requires flexible and repeated opportunities for input. One-off consultations are insufficient.

Finally, when advising other cities, Skellefteå stresses the importance of true cross-departmental collaboration and continuous stakeholder involvement. They do not currently plan to create additional resources or toolkits beyond those developed by VARCITIES, instead relying on the project's official outputs to share knowledge going forward.

5 Upscaling and Replication guidelines for follower cities

Moving from a successful pilot project to a city or region-wide strategy requires a deliberate shift in thinking: from managing a single, contained visionary solution to embedding its principles, processes, and outcomes into the core operational fabric of the city. An upscaling strategy is not simply about copying and pasting a solution; it is about replicating the conditions for success and adapting them to new contexts. This section provides practical guidelines for follower cities interested in replicating VARCITIES interventions. It summarises the key steps, considerations, and tools needed for successful implementation.

This strategy below outlines a framework for embedding pilot successes into the core functions of municipal governance, with a focus on long-term replication and systemic transformation.

5.1 Preconditions for Scaling and Replication

Successful replication is contingent upon a number of critical preconditions, which must be secured during or immediately following the pilot phase:

- Comprehensive Impact Evaluation -> Evaluate the pilot using a multidimensional framework covering environmental, social, economic, and digital outcomes.
 - Plan monitoring from the outset: Identify which key performance indicators (KPIs) are most relevant
 - Set up measurement tools: Install sensors or conduct surveys to track progress.
 - Centralize data via a common platform (e.g., VARCITIES Health & Well-Being dashboard).
 - Build evidence: Collecting robust data helps build an evidence base to secure future support.
- A multiple-benefits analysis strengthens prioritization, attracts investment, and supports alignment with broader goals like health equity and climate resilience.
- Secured Political and Senior Management Buy-in
- Explicit support from political leadership and senior municipal management is essential. Such alignment facilitates interdepartmental coordination, unlocks financial resources, and ensures continuity across electoral cycles.
- A Replication Playbook
- Documenting the process - rather than just the outputs - is essential for institutional learning. This playbook should be a practical guide distilling your experience into actionable steps, including templates for stakeholder engagement, technical



specifications for common technologies, risk mitigation checklists, and procurement lessons.

5.2 Strategy for Upscaling and Replication

Four interdependent pillars underpin the transition from Visionary Solution to systemic integration: governance, finance, technology, and community engagement.

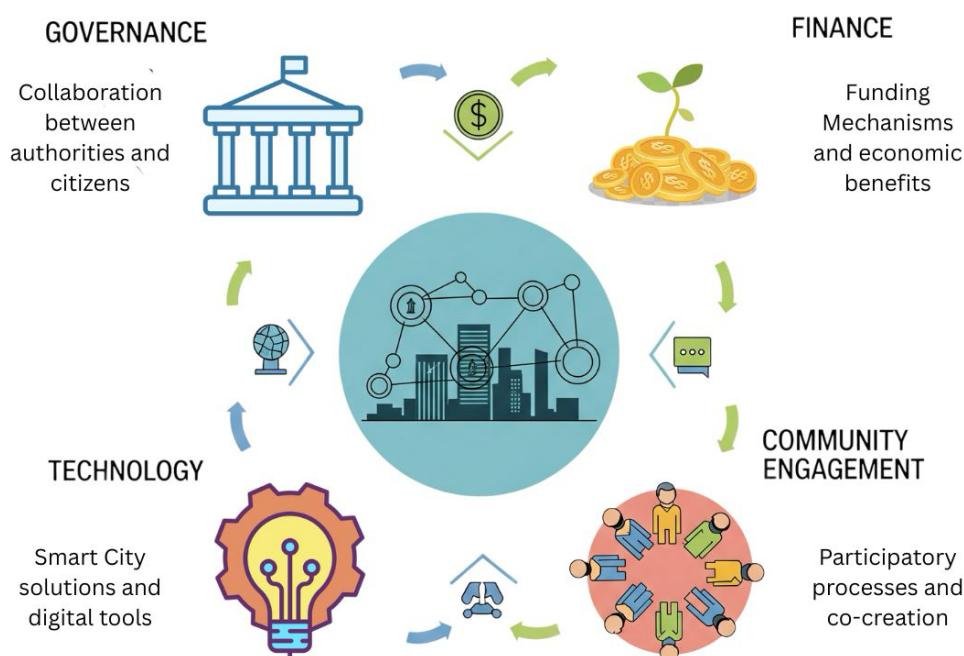


Figure 47: Replication Pillars infographic

Pillar 1: Governance and Institutional Integration

The goal is to move from project to policy, making integrated design the city's default operating mode.

- **Embed Principles into Policy:** Update planning regulations, design guidelines, and climate action plans to institutionalize co-creation processes, multiple-benefits thinking, and public well-being metrics.
- **Foster Permanent Cross-Departmental Collaboration:** Break down administrative silos by establishing permanent inter-departmental working groups focused on green infrastructure and public well-being. Inspired by the pilot's collaborative model, these

teams ensure departments, such as Planning, Environment, Transport, IT, and Community Services work cohesively, sharing budgets and expertise. This approach also fosters synergies. For example, coordinate Nature-Based projects with related city initiatives like bike lanes, climate action plans, or cultural events to maximize impact.

- Streamline and De-Risk Future Implementations: Use the lessons from the pilot to reform internal processes.
 - Permitting: Develop a fast-track or coordinated permitting process for approved types of green infrastructure projects to avoid the delays seen in several pilots.
 - Procurement: Create framework agreements with trusted suppliers for common technologies (e.g., sensors, smart lighting) and services. Standardize procurement language to include quality, lifecycle cost, and maintenance criteria, not just the lowest initial price.

Pillar 2: Sustainable Financing and Investment

A city-wide program cannot rely on a single project grant. It requires a diversified and sustainable financial model.

- Develop a Diversified Funding Portfolio: Your strategy should identify a mix of funding sources:
 - Municipal Budgets: Earmark a dedicated percentage of the annual capital budget for health and wellbeing initiatives.
 - National and Supranational Funds: Actively pursue larger grants from national (e.g., recovery funds) and EU programs (e.g., European Urban Initiative, LIFE) using your successful pilot as proof of concept.
 - Public-Private Partnerships (PPPs): Explore partnerships with private developers, requiring them to contribute to or implement public green spaces and smart infrastructure as part of their development approvals.
- Establish Long-Term Operational Budgets: Establish realistic, long-term Operational & Maintenance budgets that account for inflation, maintenance, and eventual replacement of assets. This ensures the long-term viability and quality of the replicated solutions.

Pillar 3: Technological and Data Infrastructure

A piecemeal approach to technology will not scale. A cohesive digital backbone is required.

- Establish a City-Wide IoT and Data Strategy: Create a municipal policy for the Internet of Things (IoT) that prioritizes open standards, interoperability, and data security. This prevents vendor lock-in and ensures that data from different projects and departments can be integrated into a central platform.
- Standardize Data Protocols: Develop city-wide protocols for data collection, anonymization (respecting GDPR), and sharing. This ensures data quality and consistency across all future projects, making city-wide analysis meaningful and reliable.
- Prioritize Scalable and Maintainable Technology: When selecting technologies for replication, balance cutting-edge innovation with practical considerations of usability,



durability, and long-term maintenance costs. The ideal technology is robust, easy for municipal staff to manage, and has a clear support model.

Pillar 4: Community Engagement and Capacity Building

As the initiative expands, community involvement must evolve from co-creation to co-maintenance and co-stewardship.

- Transition from Co-Design to Co-Stewardship: Develop engagement activities that empower citizens to take an active role in the long-term care of their public spaces.
- Build Local Capacity: Provide training for municipal staff and community partners. This ensures the necessary skills for managing integrated projects are embedded within the community and the institution, not just with the original pilot team.
- Create a Continuous Feedback Loop: Use a mix of digital platforms (e.g., a city app) and regular in-person forums to maintain an ongoing dialogue with citizens. This ensures that scaled solutions continue to meet evolving community needs and allows the city to remain responsive and adaptive.

5.3 A Step-by-Step Plan for Implementing Replication

5-STEP PLAN FOR IMPLEMENTING REPLICATION

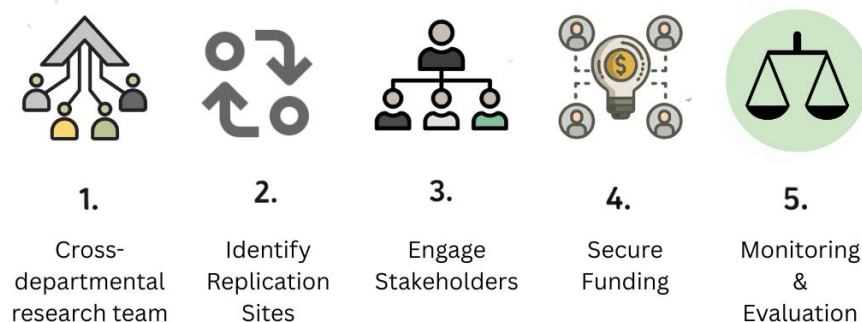


Figure 48: 5-step plan for implementing VS replication

1. Form a Cross-Departmental Replication Team: Create a permanent team with representatives from key departments (Planning, Environment, IT, Finance, Community) to champion and coordinate the upscaling strategy.
2. Identify and Prioritize Replication Areas: Use a data-driven approach to select the next neighborhoods or districts for replication. Prioritize areas with the greatest need (such as poor air quality and lack of green and cultural spaces).
3. Engage stakeholders early: Involve citizens, local NGOs, businesses and technical experts from the beginning. VARCITIES pilots show that co-creation workshops and ongoing community input lead to higher acceptance and better-designed solutions
4. Secure Funding and Launch: Use the diversified funding strategy to secure the necessary investment for the next wave of projects.
5. Monitor, Evaluate, and Iterate: Treat each new implementation as a learning opportunity. Continuously feed data and lessons back into the central strategy to refine and improve the city-wide program over time.

By following this strategic framework, the city can successfully transition from an inspiring pilot to a transformative, city-wide movement for creating healthier, more resilient, and more equitable urban environments.

6 Conclusions

This section concludes the Replication Toolkit by summarising the main findings, highlighting lessons learned, and outlining next steps for replication and scaling of Visionary Solutions.

The D7.4 Replication Toolkit is designed to democratize innovation. It helps any city – big or small – become a “Visionary City” by learning from VARCITIES pilots. In summary, the Toolkit shows that integrating nature-based infrastructure (parks, green corridors, wetlands) with digital services (sensors, apps, data platforms) can measurably improve health, social life and the environment.

More importantly, it proves these solutions are repeatable: with clear roadmaps, KPIs and guidance, one city’s success story can become many cities’ outcome. By emphasizing co-creation, data-driven evaluation and cross-city collaboration (including a 28-city city-to-city exchange network, VARCITIES builds confidence in these methods. The Toolkit further solidifies confidence: it offers concrete steps and examples, not just theory. As one project summary notes, this process enables the standardization of design and implementation of VEs so future adopters can have a common understanding and a running start.



Annex I – Multiple Benefits by city pilot

The list of Multiple Benefits is organized by key challenges and can be found below:

- Nature- based solutions: Climate Resilience, Water management, Green Space Management, Biodiversity Enhancement; Air Quality, Place Regeneration,
- Socio-cultural Solutions: Knowledge and Social Capacity Building, Participatory Planning and Governance, Health and Wellbeing, Integrated Planning, Policies and Regulations,
- Digital solutions: Environmental Monitoring, Digital place regeneration, Digital participation, Digital health and Wellbeing monitoring, Smart and Resilient Urban Infrastructure, Sustainable Built Environment.

1 Chania

Below is a general overview of the key multiple benefits agreed upon for the city of Chania. The graph and table show only those multiple benefits that scored more than 3 out of 5 in our evaluation survey.

The comprehensive analysis conducted for the city of Chania illustrates the relationship between the selected multiple benefits and the KPIs monitoring system developed by the project.

Chania Multiple benefits and KPIs									
Key challenges	Multiple benefits	Multiple benefits rating	Visionary Solutions		KPIs				
			VS number	VS Group	ID	INDICATOR Title	TOPIC (proposal)	METRIC	UNITS
Nature-based solutions	Climate Resilience	Removed carbon via storage in vegetation and/or soil;	3						
			VS1	1	1, 1	C removed/stored by vegetation	Environmental, Chemical	C tons removed/stored by vegetation per unit area per unit time	C tons km-2 year-1
		Reduced heatwave incidence	VS1, VS2	1,2	1, 2	Decrease in mean or peak daytime local temperatures	Temperature reduction	Variation of local mean/peak daily temperature	°C
			VS1	1	1, 3	Measures of human comfort	Temperature reduction	Physiological Equivalent Temperature (PET), Predicted Mean Vote (PMV)	various
			VS1	1	1, 6	TXx, Monthly Mean Value of Daily			

				Maximum Temperature			
				VS1	1	1, 7	Cooling of Ambient Air
	water management	Reduced surface runoff following rain events;	3	VS1	1	2, 8	
	green space management	Green space accessibility increased ;	5	VS1	1	4, 7	Green-related social service provided to population Access of residents/employees by foot to open space: sports centre, recreation area, or green space Social dimensionless
				VS1	1	6, 8	Average distance or travel time to sports centre, recreation area or green space Socio-cultural km / min
				infrastructure: Normalized Difference Vegetation Index			
	Biodiversity Enhancement	Increased animal and plant species diversity within a defined area	3	VS1	1	4, 23	Tree species composition in the green space and percent of live tree population by area of native origin
	air quality	A lower number of days during which air quality parameters exceed threshold values;	5	VS1, VS2	1,2	5, 5	Physical air quality indicators: temperature, humidity, etc. Environmental average measured temperature and humidity (monthly, annual) °C, %
				VS1, VS2	1,2	5, 6	Chemical air quality indicators Environmental annually average concentrations of SO2, Nox, PM2.5, PM10, O3, CO, NH3, Cl, CO2, organic substances (including PAH) µg of pollutant m-3, others (for each species)
				VS1	1	5, 10	Modelled O3, SO2, NO2 and CO Capture/Removal by Vegetation Total
				VS1	1	5, 11	Particulate Matter Removed by Vegetation

				VS1	1	5, 12	Oxygen production			
				VS2	2	5, 13	European Air Quality Index			
				VS2	2	5, 14	Number of Days During which Air Quality Parameters			
	place regeneration	Enhanced place attachment;	4	VS1	1	4, 22	Total vegetation cover (total leaf area)			
				6.1 is being measured by Gzira not Chania	6.1 is being measured by Gzira not Chania	6, 10	Perceived Quality of Urban Green			
		Increased recreational value of public space;	5	VS1	1	4. 3a	Spaces 4.3.a Recreational (number of visitors) or cultural (people involved, children in educational activities) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time	No. of visitors year-1
				VS1	1	4. 3b	4.3.b Recreational (number of recreational activities) or cultural (number of cultural events) value of green spaces			No. of recreational activities year-1
		Preservation of cultural heritage:	5	VS1	1	6, 9	Access of residents to cultural facilities on foot	Socio-cultural	Average distance or travel time to cultural facilities	km / min
	Socio-cultural Solutions	Knowledge and Social Capacity Building	4	VS1	1	7, 4	Perceptions of citizens on urban nature	Social	Counting visitors on net-based information board	number of visitors
		Participatory Planning and Governance	4	VS1 VS2	1,2	7, 8	Citizen participation in and co-creation of the design, implementation	Social	No. of people participating to development and delivery of interventions (No. of people	No. of people / year

			3	VS1	1,2	8, 5	n and evaluation of project interventions Personal and social background of people who participated in the project's activities	Social Justice	who represent themselves as citizens)	no. of people per category (age, education level, profession, ...)	no. of people per category
		VS2									
		Public-private partnership activated;		VS1	1,2	10 ,9	Public / Private Investments in the 5 years of the project	Economic	Public Private Investments the end of project	Euros	
			VS2								
	Social Justice and Social Cohesion	Enhanced trust and solidarity within the community	3	VS1	1	9, 32	Association between Quality of Life and Social Relations				
				VS1	1	9, 34	Association between Quality of Life and Neighbourhood Environment				
	Health and Wellbeing	Level of outdoor physical activity improved	4	VS1	1,2	9, 16	Number / share of people being physically active (min. 30 min 3 times per week)	Indicators related to physical activity	Number / share of people being physically active (min. 30 min 3 times per week)		No of people / %
				VS2							
					VS2	2	9, 19	Increase in walking and cycling in and around areas of interventions	Indicators related to physical activity	No. of people and average time spent in walking and cycling in and around areas of interventions	No. of people / hours per week per capita
			Reduced chronic stress and cardiovascular diseases	4	VS2	2	9, 4	Noise reduction rates	Psychological	Noise level within a defined road buffer dB(A) m-2 vegetation unit	dB(A) m-2 vegetation unit
						VS1	1	9, 20	Smoke cessation due to sports activities in green areas	Health indicators related to physical activity	smoking habits (never-, ex- and current smokers + ciagarettes, e-cigarettes, oral moist tobacco ("snus"), amount smoked
		higher quality of life	4	VS1	1	9, 8	Feeling of improving the quality of life (the Quality of Life questionnaire)	Psychological	Quality of Life questionnaire	Scales' scores	
					VS1		9, 29	Association Between			

				VS1	1	9,3	Quality of Life and Human Performance and Well-being Association between Quality of Life and Physical Health			
				VS1	1	9,31	Association between Quality of Life and Psychological Health			
				VS1 VS2	1,2	10,8	Saved healthcare spending Association between Quality of Life and Residential Environment	Economic	Average annual healthcare spending	Euros per year / %
				VS1	1	9,33	Association between Quality of Life and Infrastructure/ Services in the Humans' Living Environment			
	New Economic Opportunities and Green Jobs	New jobs created	1	VS1 VS2	1,2	10,1	No. of jobs created; gross value added	Economic	No. of jobs created; gross value added	No. of jobs created; Euros
				VS1	1	10,5	Definition of parameters for (re)designing of green public spaces based on the well-being of users	Economic	yes/no (parameters have been defined or not, to which degree, ...)	
	Integrated Planning, Policies and Regulations	Innovation in processes and decision-making	5	VS1 VS2	1,2	10,6	Replication of solutions	Economic	yes/no (NBS have been replicated elsewhere or not, where, to which degree, ...)	
	Citizen Focus	Users' awareness of energy-related issues increased :	1	VS1 VS2	1,2	7,11	Number of individuals that is aware of the project's objectives, content and processes	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no./% of individuals/participants

Digital solutions	environmental monitoring	Data driven development 94oncent rat for carbon monitoring	3	VS1	1	1, 1	C removed/stored by vegetation	Environmental, Chemical	C tons removed/stored by vegetation per unit area per unit time	C tons km-2 year-1
		Data driven development 94oncent rat for temperature monitoring	5	VS1, VS2	1,2	1, 2	Decrease in mean or peak daytime local temperatures	Temperature reduction	Variation of local mean/peak daily temperature	°C
				VS1	1	1, 3	Measures of human comfort	Temperature reduction	Physiological Equivalent Temperature (PET), Predicted Mean Vote (PMV)	various
				VS1	1	1, 6	TXx, Monthly Mean Value of Daily Maximum Temperature			
				VS1	1	1, 7	Cooling of Ambient Air			
		Data driven development 94oncent rat for air monitoring	5	VS1, VS2	1,2	5, 5	Physical air quality indicators: temperature, humidity, etc.	Environmental	average measured temperature and humidity (monthly, annual)	°C, %
				VS1, VS2	1,2	5, 6	Chemical air quality indicators	Environmental	annually average concentrations of SO2, Nox, PM2.5, PM10, O3, CO, NH3, Cl, CO2, organic substances (including PAH)	µg of pollutant m-3, others (for each species)
				VS1	1	5, 10	Modelled O3, SO2, NO2 and CO Capture/Removal by Vegetation			
				VS1	1	5, 11	Total Particulate Matter Removed by Vegetation			
				VS1	1	5, 12	Oxygen production			

	digital place regeneration	Increased recreational value of public space;	4	VS1	1	6, 10	Perceived Quality of Urban Green Spaces			
				VS1	1	4. 3a	4.3.a Recreational (number of visitors) or cultural (people involved, children in educational activities) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time	No. of visitors year-1
				VS1	1	4. 3b	4.3.b Recreational (number of recreational activities) or cultural (number of cultural events) value of green spaces			No. of recreational activities year-1
				VS1	1	4, 7	Green-related social service provided to population	Social		dimensionless
	Sustainable Built Environment	Resilience of energy infrastructures increased	2	VS1	1	1, 5	Local energy production from renewable energy sources	Energy savings	Energy saved per unit time from SMART and Res-based technology	kWh year-1
	Digital participation	Support e-learning with digital devices	4	VS1 VS2	1,2	7, 4	Perceptions of citizens on urban nature	Social	Counting visitors on net-based information board	number of visitors
		increased e-participation	4	VS1 VS2	1,2	7, 8	Citizen participation in and co-creation of the design, implementation and evaluation of project interventions	Social	No. of people participating to development and delivery of interventions (No. of people who represent themselves as citizens)	No. of people / year
				VS1 VS2	1,2	8, 5	Personal and social background of people who participated in the project's activities	Social Justice	no. of people per category (age, education level, profession, ...)	no. of people per category

				VS1 VS2	1,2	7, 11	Number of individuals that is aware of the project's objectives, content and processes	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no./% of individuals/participants
	Health and Wellbeing monitoring	Data driven development 96oncentrat for 96oncentr health monitoring	4	VS1 VS2	1,2	9, 16	Number / share of people being physically active (min. 30 min 3 times per week)	Indicators related to physical activity	Number / share of people being physically active (min. 30 min 3 times per week)	No of people / %
			VS2	2	9, 19	Increase in walking and cycling in and around areas of interventions	Indicators related to physical activity	No. of people and average time spent in walking and cycling in and around areas of interventions	No. of people / hours per week per capita	
		Data driven development 96oncentrat for noise monitoring	5	VS2	2	9, 4	Noise reduction rates	Psychological	Noise level within a defined road buffer dB(A) m-2 vegetation unit	dB(A) m-2 vegetation unit

2 Gzira

Below is a general overview of the key multiple benefits agreed upon for the city of Gzira. The graph and table show only those multiple benefits that scored more than 3 out of 5 in our evaluation survey.

The comprehensive analysis conducted for the city of Gzira illustrates the relationship between the selected multiple benefits and the KPIs monitoring system developed by the project.

Gzira Multiple benefits and KPIs									
Key challenges	Multiple benefits	Multiple benefits rating	Visionary Solutions		KPIs				
			VS number	VS Group	ID	INDICATOR Title	TOPIC (proposal)	METRIC	UNITS
Nature-based solutions	Green Space Management	Green space accessibility increased	2	VS3	5	4, 2	Accessibility of urban green spaces for population	Social	Average distance or travel time (by feet or public transportation) to urban green spaces km / min (by feet, by bus)
		Total green space within a defined area increased;	3	VS3, VS1	3,5	4, 1	Surface of public green space per capita	Social	Average surface of public green space per capita m2 per capita
	Biodiversity Enhancement	Increased animal and plant species diversity within a defined area	1	VS1, VS3	3,5	6, 1	Urban green: Index of biodiversity, provision and demand of ecosystem services	Urban green	Quantify length of exposure to the urban env. And time lag in ecological responses time and spatial distance
	Place Regeneration	Increased recreational value of public space	3	VS3	5	4. 3a	4.3.a Recreational (number of visitors) or cultural (people involved, children in educational activities) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time No. of visitors year-1

				VS3	5	4.3b Recreation al (number of recreationa l activities) or cultural (number of culturaleve nts) value of green spaces			No. of recreational activities year-1	
Socio-cultural Soluti ons	Participat ory Planning and Governan ce	Boosted empower ment;	4	VS1	3	7, 16	No of persons involved (on average) in the project activities	Social	No of persons involved (on average) in the project activities per unit time (all participants in workshops and other activities)	No of persons / year or age
				VS2, VS3	4,5	7, 8	Citizen participatio n in and co- creation of the design, implement ation and evaluation of project interventio ns	Social	No. of people participating to developmen t and delivery of interventions (No. of people who represent themselves as citizens)	No. of people / year
				VS1, VS2, VS3	3,4,5	8, 5	Personal and social backgroun d of people who 98oncentra ti in the project's activities	Social Justice	no. of people per category (age, education level, profession, ...)	no. of people per category
	Participat ory Planning and Governan ce	Public-private partnershi p activated;	3	VS1 VS2 VS3	3,4,5	10 ,9	Public / Private Investment s in the 5 years of the project	Economic	Public Private Investments the end of project	Euros
	Social Justice and Social Cohesion	Inclusion of different social groups in NBS projects	4	VS1 VS2	3,4	8, 9	Participatio n of immigrants	Social Cohesion	% of immigrants participating in project activities relative to total participation	%
Enhanced trust and solidarity within the		3	VS1	3	9, 13	Residential attachment and satisfactio n	Psychologic al	Residential attachement and residential satisfaction scale	Scales' scores	

		communit y		VS1, VS2	3,4	9, 5	No of hours spent outdoors, time people spend in the facility	Psychologic al	total or per capita No of hours spent outdoors per week, Average amount of time people spend in the facility	No of hours per week per capita / hours per capita
	Health and Wellbeing	Level of outdoor physical activity improved	2	VS1	3	9, 19	Increase in walking and cycling in and around areas of interventio ns	Indicators related to physical activity	No. of people and average time spent in walking and cycling in and around areas of interventions	No. of people / hours per week per capita
		Higher quality of life	1	VS2	4	9, 8	Feeling of improving the quality of life (the Quality of Life questionna ire)	Psychologic al	Quality of Life questionnaire	Scales' scores
				VS1	3	10 ,8	Saved healthcare spending	Economic	Average annual healthcare spending	Euros per year / %
	New Economic Opportun ities and Green Jobs	New jobs created	2	VS3	5	10 ,5	Definition of 99oncentra for (re)designi ng of green public spaces based on the well- being of users	Economic	yes/no (parameters have been defined or not, to which degree, ...)	
	Integrate d Planning, Policies and Regulatio ns	Innovation in processes and decision- making	4	VS1 VS2 VS3	3,4,5	10 ,6	Replication of solutions	Economic	yes/no (NBS have been replicated elsewhere or not, where, to which degree, ...)	
	Integrate d Planning, Policies and Regulatio ns	Territorial attractive ness improved	3	VS3, VS2	4,5	8, 1	The availability and distribution of parks (different types) or ecosystem services with respect to specific individual or household socioecon omic profiles	Social Justice	surface area, social 99oncentration 99, fiscal revenue by consumption unit, 99oncentra distance	distance, no. of households in various categories

		landscape design									
	Citizen Focus	Users' awareness of energy-related issues increased:	2	VS2	4	7, 11	Number of individuals that is aware of the project's objectives, content and processes	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no./% of individuals/participants	
Digital Solution	Environmental monitoring	Data driven development 100oncentrat for air monitoring	4	VS2	4	5, 6	Chemical air quality indicators	Environmental	annually average concentrations of SO2, Nox, PM2.5, PM10, O3, CO, NH3, Cl, CO2, organic substances (including PAH)	µg of pollutant m-3, others (for each species)	
				VS2	4	5, 7	Air pollution episodes	Environmental	No. of days exceeding air quality limit values per year	No. of exceedance days year-1 (for each pollutant species)	
	Digital participation	increased e-participation	5	VS2, VS3	4,5	7, 8	Citizen participation in and co-creation of the design, implementation and evaluation of project interventions	Social	No. of people participating to development and delivery of interventions (No. of people who represent themselves as citizens)	No. of people / year	
				VS2	4	7, 11	Number of individuals that is aware of the project's objectives, content and processes	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no./% of individuals/participants	

3 Skelleftea

Below is a general overview of the key multiple benefits agreed upon for the city of Skelleftea. The graph and table show only those multiple benefits that scored more than 3 out of 5 in our evaluation survey.

The comprehensive analysis conducted for the city of Gzira illustrates the relationship between the selected multiple benefits and the KPIs monitoring system developed by the project.

Skelleftea Multiple benefits and KPIs									
Key challenges	Multiple benefits	Multiple benefits rating	Visionary Solutions		KPIs				
			VS number	VS Group	ID	INDICATOR Title	TOPIC (proposal)	METRIC	UNITS
Nature-based solutions	Water management	Reduced surface runoff following rain events;	4	VS1, VS2	6	2, 7	Economic	Monetary savings from reduced stormwater treated in public sewerage system	Euros year-1
		Increased surface water storage and/or groundwater recharge	4	VS1, VS2	6	2, 2	Physical	Water volume retention capacity by vegetation and soil per unit surface per unit time	m3 km-2 s-1 or litres km-2 s-1
		Water quality improvement.	2	VS1	6	2, 6	Chemical	pH, hardness, N and P levels, salinity, heavy metals, organic pollutants, dissolved O2 and CO2, COD, BOD, saprobia index, Coliform index, phytoplankton index, etc.	various (e.g. 1020ncentra/l)
	Biodiversity Enhancement	A higher number of native plant species;	4	VS5	8	4, 15	Pollinator species increase	Environmental	Increasing numbers of species. Inventory of species suitable for pollinating insects before interventions compared to species that 1020ncent to survive after planting. Number of bee

		Increased animal and plant species diversity within a defined area	4	VS2	6	4, 11	Species richness and composition with respect to indigenous vegetation and local/national biodiversity targets Total area of designated sites of local biodiversity importance within the city (habitat/species management areas)	Environmental	hotels built in the area population size of each species / no. of (new) species	
				VS2	6	4, 12		Environmental	Total area of designated sites of local biodiversity importance within the city	km2
	Place Regeneration	Increased recreational value of public space;	5	VS1, VS2, VS3, VS4	6, 7, 8	4. 3a	4.3.a Recreational (number of visitors) or cultural (people involved, children in educational activities) value of green spaces 4.3.b Recreational (number of recreational activities) or cultural (number of cultural events) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time	No. of visitors year-1
Socio-cultural Solutions	Knowledge and Social Capacity Building	Increased citizen involvement in environmental educational activities	3	VS4, VS5	8	7, 5	Social values for urban ecosystems and biodiversity	Social	Counting visitors in summertime and compare it with visitors with the interventions completed	number of visitors
		Support social learning regarding	5	VS4, VS5	8	7, 3	Social learning concerning urban	Social	No. of learning supporting units distributed to the population	No. of learning supporting units

		ecosystems and their functions:			ecosystems and their functions/services			(schools, adults, ...) / level of learning		
			VS4	8	7, 4	Perceptions of citizens on urban nature	Social	Counting visitors on net-based information board	number of visitors	
	Participatory Planning and Governance	Boosted empowerment;	4	VS4	8	7, 8	Citizen participation in and co-creation of the design, implementation and evaluation of project interventions	Social	No. of people participating to development and delivery of interventions (No. of people who represent themselves as citizens)	No. of people / year
				VS5	8	8, 5	Personal and social background of people who participated in the project's activities	Social Justice	no. of people per category (age, education level, profession, ...)	no. of people per category
		Public-private partnership activated;	1	VS1, VS2	6	10, 9	Public / Private Investments in the 5 years of the project	Economic	Public Private Investments the end of project	Euros
Health and Wellbeing	level of outdoor Physical activity improved	3	VS3	7	9, 19	Increase in walking and cycling in and around areas of interventions	Indicators related to physical activity	No. of people and average time spent in walking and cycling in and around areas of interventions	No. of people / hours per week per capita	
	Reduced chronic stress and cardiovascular diseases	2	VS1, VS2	6	9, 27	Anxiety levels	Psychological	Anxiety assessed with self-report measures	Scales' scores	
	Higher quality of life	4	VS1, VS2, VS3, VS4, VS5	7	9, 28	Affective status	Psychological	Affective status assessed with self-reported measures	Scales' scores	
			VS1, VS2, VS3, VS4, VS5	6	10, 8	Saved healthcare spending	Economic	Average annual healthcare spending	Euros per year / %	
Integrated Planning, Policies and	Innovation in processes and	1	VS1, VS2	6	10, 6	Replication of solutions	Economic	yes/no (NBS have been replicated elsewhere or not, where, to		

	Regulations	decision-making	which degree, ...)					
	Citizen Focus	Users' awareness of energy-related issues increased :	1	VS4, VS5	8	7, 11	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks) no./% of individuals/participants
Digital solutions	Digital place regeneration	Increased recreational value of public space;	2	VS1, VS2, VS3, VS4	6, 7, 8	4.3a Recreational (number of visitors) or cultural (people involved, children in educational activities) value of green spaces 4.3b Recreational (number of recreational activities) or cultural (number of cultural events) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time No. of visitors year-1 No. of recreational activities year-1
	Digital participation	increased e-participation	1	VS4, VS5	8	7, 11	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks) no./% of individuals/participants
	Digitally Integrated Energy and Infrastructure Networks	Smart energy services establishment:	2	VS3, VS5	7	4, 21	Digital	No. of sensors



4 Dundalk

Below is a general overview of the key multiple benefits agreed upon for the city of Dundalk. The graph and table show only those multiple benefits that scored more than 3 out of 5 in our evaluation survey.

The comprehensive analysis conducted for the city of Dundalk illustrates the relationship between the selected multiple benefits and the KPIs monitoring system developed by the project.

Dundalk Multiple benefits and KPIs									
Key challenges	Multiple benefits	multiple benefits rating	Visionary Solutions		KPIs				
			VS number	VS Group	ID	INDICATOR Title	TOPIC (proposal)	METRIC	UNITS
nature-based solutions	Water management	Reduced surface runoff following rain events;	3	VS2	10	2, 4	Reduction in water routed to urban sewerage system	Physical	Variation in water volume treated by the sewerage system per unit time m3 year-1 / %
	Green Space Management	Green space accessibility increased ;	5	VS2, VS3	10,11	4, 2	Accessibility of urban green spaces for population	Social	Average distance or travel time (by feet or public transportation) to urban green spaces km / min (by feet, by bus)
				VS3, VS2	10,11	4, 6	Proximity of green infrastructure to green travel routes	Social	Proximity of green infrastructure to green travel routes km
	Biodiversity Enhancement	Increased animal and plant species diversity within a defined area	5	VS2	10	4, 11	Species richness and composition with respect to indigenous vegetation and local/national biodiversity targets	Environmental	population size of each species / no. of (new) species
	Air Quality	A lower number of days during which air quality parameters exceed threshold values;	5	VS2, VS3	10,11	5, 6	Chemical air quality indicators	Environmental	annually average concentrations of SO2, Nox, PM2.5, PM10, O3, CO, NH3, Cl, CO2, organic substances (including PAH) µg of pollutant m-3, others (for each species)

[illegible]

[illegible]

		Higher quality of life	5	VS1, VS2, VS3	9,10,11	9,8	health conditions and support needed Feeling of improving the quality of life (the Quality of Life questionnaire)	Psychological	Quality of Life questionnaire	Scales' scores
				VS1, VS2, VS3	9,10,11	10,8	Saved healthcare spending	Economic	Average annual healthcare spending	Euros per year / %
	New Economic Opportunities and Green Jobs	New jobs created	3	VS1, VS2, VS3	9,10,11	10,1	No. of jobs created; gross value added	Economic	No. of jobs created; gross value added	No. of jobs created; Euros
				VS2, VS3, VS1	9,10,11	10,5	Definition of parameters for (re)designing of green public spaces based on the well-being of users	Economic	yes/no (parameters have been defined or not, to which degree, ...)	
				VS1, VS2, VS3	9,10,11	10,4	Increased footfall and spend in the areas of interventions	Economic		
	Integrated Planning, Policies and Regulations	Innovation in processes and decision-making	5	VS1, VS2, VS3	9,10,11	10,6	Replication of solutions	Economic	yes/no (NBS have been replicated elsewhere or not, where, to which degree, ...)	
		Users' awareness of energy-related issues increased :	3	VS1, VS2, VS3	9, 10, 11	7, 11	Number of individuals that is aware of the project's objectives, content and processes	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no. /% of individuals/participants
Digital solutions	Environmental monitoring	Data driven development 1100nconcentrat for air monitoring	4	VS2, VS3	10,11	5, 6	Chemical air quality indicators	Environmental	annually average concentrations of SO2, Nox, PM2.5, PM10, O3, CO, NH3, Cl, CO2, organic substances (including PAH)	µg of pollutant m-3, others (for each species)

	Digital place regeneration	Increased recreational value of public space;	5	VS1, VS2, VS3	9,10	4.3a Recreational (number of visitors) or cultural (people involved, children in educational activities) value of green spaces 4.3b Recreational (number of recreational activities) or cultural (number of cultural events) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time	No. of visitors year-1
				VS1, VS2, VS3	9,10	4.3b			No. of recreational activities year-1
	Smart Urban Mobility and Digital Infrastructure	Optimized Traffic Flow and Reduced Congestion Through Digital Mobility	3	VS3	11	6, 7 Road surface dedicated to pedestrians	Socio-cultural	percentage of road network area that is dedicated to pedestrians	%
	Smart and Resilient Urban Infrastructure	Enhanced Energy Infrastructure	4	VS2	10	1, 4 Energy	Energy savings	Energy and C tons saved per unit time	kWh year-1
		Resilience through Smart Technologies		VS1, VS2	9,10	1, 5 Local energy production from renewable energy sources	Energy savings	Energy saved per unit time from SMART and Res-based technology	kWh year-1
		Better environmental resource management through Digital Integration	4	VS2, VS3, VS1	9,10,11	6, 6 Use of reclaimed/recycled building materials	Building efficiency & environmental design	quantity or percentage of building materials reclaimed from existing buildings	m3, tons, %
	Digitally Integrated Energy and Infrastructure Networks	Development of Smart and Local Energy Supply Chains	1	VS3, VS1	9,11	10, 3 Resource efficiency in the urban system	Economic	CO2 emissions per capita	CO2 tons / year per capita
	e-participation	increased e-participation	5	VS1, VS2, VS3	9, 10, 11	8, 5 Personal and social background of people who participated in the project's activities	Social Justice	no. of people per category (age, education level, profession, ...)	no. of people per category

		increased e-participation	VS1, VS2, VS3	9, 10, 11	7, 11	Number of individuals that is aware of the project's objectives, content and processes	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks) Average number of individuals with functional disabilities using facilities & participating in the activities carried out under the project per unit time	no./% of individuals/participants
		increased e-participation	VS1, VS2	9,10	8, 8	Participation of individuals with functional disabilities	Social Cohesion	No. of individuals / year	
	Health and Wellbeing monitoring	Data driven development 1120ncen trat for 1120ncen tr health monitorin g	VS1, VS2, VS3	9,10,11	9, 5	No of hours spent outdoors, time people spend in the facility	Psychologic al	total or per capita No of hours spent outdoors per week, Average amount of time people spend in the facility	No of hours per week per capita / hours per capita
		Data driven development 1120ncen trat for 1120ncen tr health monitorin g	VS3,VS 2	10,11	9, 19	Increase in walking and cycling in and around areas of interventions	Indicators related to physical activity	No. of people and average time spent in walking and cycling in and around areas of interventions	No. of people / hours per week per capita
		Data driven development 1120ncen trat for noise monitorin g	VS2, VS3, VS1	9,10,11	9, 4	Noise reduction rates	Psychologic al	Noise level within a defined road buffer dB(A) m-2 vegetation unit	dB(A) m-2 vegetation unit

5 Castelfranco Veneto

Below is a general overview of the key multiple benefits agreed upon for the city of Castelfranco Veneto. The graph and table show only those multiple benefits that scored more than 3 out of 5 in our evaluation survey.

The comprehensive analysis conducted for the city of Castelfranco Veneto illustrates the relationship between the selected multiple benefits and the KPIs monitoring system developed by the project.

Castelfranco Veneto Multiple benefits and KPIs									
Key challenges	Multiple benefits	multiple benefits rating	Visionary Solutions		KPIs				
			VS number	VS Group	ID	INDICATOR Title	TOPIC (proposal)	METRIC	UNITS
Nature-based solutions	Enhanced place attachment;	2	VS2	13	9, 12	Sense of place and received restorativeness	Psychological	Perceived Restorativeness Scale. Scenic beauty judgments for different types of natural scenes	Scales' scores
	Place Regeneration	2	VS1, VS3	12	4. 3a	4.3.a Recreational (number of visitors) or cultural (people involved, children in educational activities) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time	No. of visitors year-1
			VS1, VS3	12	4. 3b	4.3.b Recreational (number of recreational activities) or cultural (number of cultural events) value of green spaces			No. of recreational activities year-1
			VS2, VS5	12,13	4, 9	Effectiveness of seating locations	Social	No. of people using seating locations per unit time / Average duration of seating time	No. of people year-1 / min per capita

Socio-cultural Solutions	Knowledge and Social Capacity Building	Increased citizen involvement in environmental educational activities;	3	VS4	12	7, 5	Social values for urban ecosystems and biodiversity	Social	Counting visitors in summertime and compare it with visitors with the interventions completed	number of visitors
		Support social learning regarding ecosystems and their functions:	3	VS4, VS6A	12	7, 3	Social learning concerning urban ecosystems and their functions/services	Social	No. of learning supporting units distributed to the population (schools, adults, ...) / level of learning	No. of learning supporting units
				VS4	12	7, 4	Perceptions of citizens on urban nature	Social	Counting visitors on net-based information board	number of visitors
	Participatory Planning and Governance	Increased openness of participatory processes	3	VS4	12	7, 1	Openness of participatory processes	Social	No. of people taking part to decisional processes (co-creation workshops, focus groups, questionnaires)	No. of people / year
		Boosted empowerment;	1	VS4	12	7, 8	Citizen participation in and co-creation of the design, implementation and evaluation of project interventions	Social	No. of people participating to development and delivery of interventions (No. of people who represent themselves as citizens)	No. of people / year
				VS2, VS4	12,13	8, 5	Personal and social background of people who participated in the project's activities	Social Justice	no. of people per category (age, education level, profession, ...)	no. of people per category
		Public-private partnership activated;	3	VS4	12	10, 9	Public / Private Investments in the 5 years of the project	Economic	Public Private Investments the end of project	Euros

Social Justice and Social Cohesion	Inclusion of different social groups in NBS projects	3	VS2, VS4	12,13	8, 8	Participation of individuals with functional disabilities	Social Cohesion	Average number of individuals with functional disabilities using facilities & participating in the activities carried out under the project per unit time	No. of individuals / year
			VS1, VS5	12	8, 10	Accessibility of open public spaces and buildings for families with baby carriages and individuals with restricted mobility	Social Cohesion	No. of accesses of families with baby carriages and individuals with restricted mobility	No. of accesses to people with physical limitations
			VS2	13	9, 27	Anxiety levels	Psychological	Anxiety assessed with self-report measures	Scales' scores
			VS3	12	9, 4	Noise reduction rates	Psychological	Noise level within a defined road buffer dB(A) m-2 vegetation unit	dB(A) m-2 vegetation unit
			VS2, VS3, VS5	12, 13	9, 6	Perceived well-being before and after the visit of green space. Can also measure metrics from health centres and hospitals to determine level of health conditions and support needed	Psychological	per capita measurements of conditions such as diabetes, cancer, heart disease and so on, number of emergency room (ER) visits in the area, number of ambulance visits	Yes/no regarding diseases, No of ER/ambulance visits.
	Higher quality of life	1	VS2	13	9, 7	Assessment of the personal satisfaction about life, emotional competences (ability to understand one's own and other's emotions) and coping strategies	Psychological	Psychological Well-Being Questionnaire	Total score and/or subscales scores

				VS2	13	9, 8	regarding everyday problems in healthy older adults Feeling of improving the quality of life (the Quality of Life questionnaire)	Psychological	Quality of Life questionnaire	Scales' scores
	Integrated Planning, Policies and Regulations	Innovation in processes and decision-making		VS4	12	10, 6	Replication of solutions	Economic	yes/no (NBS have been replicated elsewhere or not, where, to which degree, ...)	
			3	VS4	12	7, 6	Inter-departmental collaboration leading to NBS designs for multi-functionality Institutional learning concerning acquisition of knowledge and understanding	Social	Diversity of stakeholders involved in co-creation	No. persons/entities
				VS4	12	7, 9		Social	Qualitative assessment	N/A
		Institutional relationship and networks created:	4	VS2, VS4	12, 13	10, 7	Number of elderly health care institutions involved in 5 years	Economic	Number of elderly health care institutions involved at the end of project	No. of institutions involved
	Citizen Focus	Users' awareness of energy-related issues increased :	3	VS4	12	7, 11	Number of individuals that is aware of the project's objectives, content and processes	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no./% of individuals/participants
Digital solutions	Sustainable Urban Mobility	Reduced traffic congestion;	2	VS1	12	6, 7	Road surface dedicated to pedestrians	Socio-cultural	percentage of road network area that is dedicated to pedestrians	%

	Data driven development 117oncentrat for temperature monitoring	5	VS2, VS3	12,13	1, 3	Measures of human comfort	Temperature reduction	Physiological Equivalent Temperature (PET), Predicted Mean Vote (PMV)	various
			VS3	12	5, 5	Physical air quality indicators: temperature, humidity, etc.	Environmental	average measured temperature and humidity (monthly, annual)	°C, %
	Data driven development 117oncentrat for air monitoring	5							
			VS3	12	5, 6	Chemical air quality indicators	Environmental	annually average concentrations of SO2, Nox, PM2.5, PM10, O3, CO, NH3, Cl, CO2, organic substances (including PAH)	µg of pollutant m-3, others (for each species)
	Increased recreational value of public space;	3	VS1, VS3	12	4. 3a	4.3.a Recreational (number of visitors) or cultural (people involved, children in educational activities) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time	No. of visitors year-1
			VS1, VS3	12	4. 3b	4.3.b Recreational (number of recreational activities) or cultural (number of culturalevents) value of green spaces			No. of recreational activities year-1
	Digital place regeneration		VS2, VS5	12,13	4, 9	Effectiveness of seating locations	Social	No. of people using seating locations per unit time / Average duration of seating time	No. of people year-1 / min per capita

	digital participation	increased e-participation	3	VS4	12	7, 5	Social values for urban ecosystems and biodiversity	Social	Counting visitors in summertime and compare it with visitors with the interventions completed	number of visitors
				VS4, VS6A	12	7, 3	Social learning concerning urban ecosystems and their functions/services	Social	No. of learning supporting units distributed to the population (schools, adults, ...) / level of learning	No. of learning supporting units
				VS2, VS4	12,13	8, 5	Personal and social background of people who participated in the project's activities	Social Justice	no. of people per category (age, education level, profession, ...)	no. of people per category
				VS2, VS4	12,13	8, 8	Participation of individuals with functional disabilities	Social Cohesion	Average number of individuals with functional disabilities using facilities & participating in the activities carried out under the project per unit time	No. of individuals / year
				VS4	12	7, 11	Number of individuals that is aware of the project's objectives, content and processes	Social	no./share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no./% of individuals/participants
	Health and Wellbeing monitoring	Data driven development 118oncentrat for noise monitoring	5	VS3	12	9, 4	Noise reduction rates	Psychological	Noise level within a defined road buffer dB(A) m-2 vegetation unit	dB(A) m-2 vegetation unit

	Health and Wellbeing monitoring	Level of outdoor physical activity improved	2	VS5	12	9, 21	Level of physical activity in distances covered and average calories burned	Indicators related to physical activity	average distance covered / calories burned	km / calories
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6 Leuven

Below is a general overview of the key multiple benefits agreed upon for the city of Leuven. The graph and table show only those multiple benefits that scored more than 3 out of 5 in our evaluation survey.

The comprehensive analysis conducted for the city of Leuven illustrates the relationship between the selected multiple benefits and the KPIs monitoring system developed by the project.

Leuven Multiple benefits and KPIs										
Key challenges		Multiple benefits	multiple benefits rating	Visionary Solutions		KPIs				
				VS number	VS Group	ID	INDICATOR Title	TOPIC (proposal)	METRIC	UNITS
Nature based solutions	Green Space Management	Green space accessibility increased;	4	VS3, VS5	14	4, 2	Accessibility of urban green spaces for population	Social	Average distance or travel time (by feet or public transportation) to urban green spaces	km / min (by feet, by bus)
				VS3	14	6, 8	Access of residents/employees by foot to open space: sports centre, recreation area, or green space	Socio-cultural	Average distance or travel time to sports centre, recreation area or green space	km / min
	Place Regeneration	Increased recreational value of public space;	5	VS5,VS1, VS3	14	4. 3a	4.3.a Recreational (number of visitors) or cultural (people involved, children in educational activities) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time	No. of visitors year-1
				VS5,VS1, VS3	14	4. 3b	4.3.b Recreational (number of recreational activities) or cultural (number of culturalevents) value of green spaces			No. of recreational activities year-1
		Preservation of	2	VS1	14	6, 9	Access of residents to cultural	Socio-cultural	Average distance or travel time to	km / min

		cultural heritage:	facilities on foot				cultural facilities		
Socio-cultural solutions	Knowledge and Social Capacity Building	Increase d citizen involvement in environmental educational activities;	2	VS1, VS2, VS3	14	7, 17	No of activities involving children	Social	No of activities involving children
	Participatory Planning and Governance	Increase d openness of participatory processes	5	VS1,VS2,VS3	14	7, 1	Openness of participatory processes	Social	No. of people taking part to decisional processes (co-creation workshops, focus groups, 121oncentration)
				VS1, VS2, VS3	14	7, 16	No of persons involved (on average) in the project activities	Social	No of persons involved (on average) in the project activities per unit time (all participants in workshops and other activities)
		Boosted empowerment;	4	VS1, VS3	14	7, 8	Citizen participation in and co-creation of the design, implementation and evaluation of project interventions	Social	No. of people participating to development and delivery of interventions (No. of people who represent themselves as citizens)
				VS1, VS3	14	8, 5	Personal and social background of people who participated in the project's activities	Social Justice	no. of people per category (age, education level, profession, ...)
		Public-private partnership activated ;	4	VS1, VS3	14	10, 9	Public / Private Investments in the 5 years of the project	Economic	Public Private Investments the end of project
	Social Justice and Social Cohesion	Inclusion of different social groups in	5	VS1, VS3, VS5	14	8, 10	Accessibility of open public spaces and buildings for families with	Social Cohesion	No. of accesses of families with baby carriages and individuals

		NBS projects					baby carriages and individuals with restricted mobility		with restricted mobility	
		Enhanced trust and solidarity within the community	4	VS1, VS3, VS4	14	9, 13	Residential attachment and satisfaction	Psychological	Residential attachment and residential satisfaction scale	Scales' scores
				VS1, VS3	14	9, 5	No of hours spent outdoors, time people spend in the facility	Psychological	total or per capita No of hours spent outdoors per week, Average amount of time people spend in the facility	No of hours per week per capita / hours per capita
	Health and Wellbeing	Level of outdoor physical activity improved	5	VS3, VS5	14	9, 16	Number / share of people being physically active (min. 30 min 3 times per week)	Indicators related to physical activity	Number / share of people being physically active (min. 30 min 3 times per week)	No of people / %
				VS3, VS5	14	9, 19	Increase in walking and cycling in and around areas of interventions	Indicators related to physical activity	No. of people and average time spent in walking and cycling in and around areas of interventions	No. of people / hours per week per capita
		Reduced chronic stress and cardiovascular diseases	2	VS4	15	9, 4	Noise reduction rates	Psychological	Noise level within a defined road buffer dB(A) m-2 vegetation unit	dB(A) m-2 vegetation unit
				VS3	14	9, 6	Perceived well-being before and after the visit of green space. Can also measure metrics from health centres and hospitals to determine level of health conditions and support needed	Psychological	per capita 122oncentrati of conditions such as diabetes, cancer, heart disease and so on, number of emergency room (ER) visits in the area, number of ambulance visits	Yes/no regarding diseases, No of ER/ambulance visits.
			3	VS1, VS3, VS4	14, 15	9, 8	Feeling of improving	Psychological	Quality of Life questionnaire	Scales' scores

		Higher quality of life		VS3	14	10,8	the quality of life (the Quality of Life questionnaire)	Saved healthcare spending	Economic	Average annual healthcare spending	Euros per year / %
	New Economic Opportunities and Green Jobs	New jobs created	3	VS1, VS3	14	10,5	Definition of parameters for (re)designing of green public spaces based on the well-being of users		Economic	yes/no (parameters have been defined or not, to which degree, ...)	
	Integrated Planning, Policies and Regulations	Innovation in processes and decision-making	4	VS1, VS3	14	10,6	Replication of solutions		Economic	yes/no (NBS have been replicated elsewhere or not, where, to which degree, ...)	
	Citizen Focus	Users' awareness of energy-related issues increased:	0	VS1,VS2,VS3, VS4,VS5	14,15	7,11	Number of individuals that is aware of the project's objectives, content and processes		Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no./% of individuals/participants
Digital solutions	Environmental monitoring	Data driven development 123once ntrat for temperature monitoring	3	VS2	14	1,2	Decrease in mean or peak daytime local temperatures		Temperature reduction	Variation of local mean/peak daily temperature	°C
				VS2	14	1,3	Measures of human comfort		Temperature reduction	Physiological Equivalent Temperature (PET), Predicted Mean Vote (PMV)	various

		Water quality improvement.	5	VS2	14	2, 6	Water quality indicators (chemical, biological)	Chemical	pH, hardness, N and P levels, salinity, heavy metals, organic pollutants, dissolved O2 and CO2, COD, BOD, saprobia index, Coliform index, phytoplankton index, etc.	various (e.g. 124oncentra/l)
		Data driven development 124once ntrat for air monitoring	3	VS2	14	5, 5	Physical air quality indicators: temperature, humidity, etc.	Environme ntal	average measured temperature and humidity (monthly, annual)	°C, %
				VS2, VS5	14	5, 6	Chemical air quality indicators	Environme ntal	annually average 124oncentrati on of SO2, Nox, PM2.5, PM10, O3, CO, NH3, Cl, CO2, organic substances (including PAH)	µg of pollutant m-3, others (for each species)
	Digital participation	increase d e-participa tion	4	VS1, VS2, VS3	14	7, 16	No of persons involved (on average) in the project activities	Social	No of persons involved (on average) in the project activities per unit time (all participants in workshops and other activities)	No of persons / year or age
				VS1,VS2,VS3, VS4,VS5	14, 15	7, 11	Number of individuals that is aware of the project's objectives, content and processes	Social	no/share of individuals/par ticipants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no./% of individuals/par ticipants
	Health and Wellbeing	Level of outdoor physical		VS3, VS5	14	9, 16	Number / share of people being physically	Indicators related to physical activity	Number / share of people being physically	No of people / %

	monitoring	activity improved				active (min. 30 min 3 times per week)		active (min. 30 min 3 times per week)	
			1	VS3, VS5	14	9, 19	Increase in walking and cycling in and around areas of interventions	Indicators related to physical activity	No. of people and average time spent in walking and cycling in and around areas of interventions
									No. of people / hours per week per capita

7 Novo Mesto

Below is a general overview of the key multiple benefits agreed upon for the city of Novo Mesto. The graph and table show only those multiple benefits that scored more than 3 out of 5 in our evaluation survey.

The comprehensive analysis conducted for the city of Novo Mesto illustrates the relationship between the selected multiple benefits and the KPIs monitoring system developed by the project.

Novo Mesto Multiple benefits and KPIs										
Key challenges		Multiple benefits	multiple benefits rating	Visionary Solutions		KPIs				
				VS number	VS Group	ID	INDICATOR Title	TOPIC (proposal)	METRIC	UNITS
Nature-based solutions	Climate Resilience	Removed carbon via storage in vegetation and/or soil;	1	VS1	16	1,1	C removed/stored by vegetation	Environmental, Chemical	C tons removed/stored by vegetation per unit area per unit time	C tons km-2 year-1
		Reduced heatwave incidence.	4	VS2, VS5	17	1,3	Measures of human comfort	Temperature reduction	Physiological Equivalent Temperature (PET), Predicted Mean Vote (PMV)	various
	Green Space Management	Green space accessibility increased;	4	VS2	17	4,2	Accessibility of urban green spaces for population	Social	Average distance or travel time (by feet or public transportation) to urban green spaces	km / min (by feet, by bus)
				VS3	17	4,7	Green-related social service provided to population	Social		dimensionless
	Biodiversity Enhancement	Improved ecological connectivity of urban green and blue spaces;	5	VS2, VS3	17	4,1 4	Increased connectivity to existing Green Infrastructure	Environmental	- Connectivity of GI (%) - Fragmentation of GI (Mesh density per pixel) - Fragmentation by artificial areas (Mesh density per pixel)	ha

	Place Regenerat ion	Derelict land reclaimed for NBS	5	VS1	16	6,4	Reclamatio n of contaminat ed land	Urban green	surface / percentage of contaminated area reclaimed	km2 / %
		Increased recreation al value of public space;	4	VS2	17	4.3 a	4.3.a Recreation al (number of visitors) or cultural (people involved, children in educationa l activities) value of green spaces	Social	No. of visitors / No. of recreational activities held per unit time	No. of visitors year-1
				VS2	17	4.3 b	4.3.b Recreational (number of recreational activities) or cultural (number of culturalevents) value of green spaces			No. of recreational activities year-1
				VS2	17	4,4	Weighted recreation opportuniti es provided by Urban Green Infrastruct ure	Social	no.of recreation opportunities provided by Urban Green Infrastructure divided by total no. of recreation opportunities	%
				VS2	17	4,5	Nature based recreation opportuniti es	Social	No. of NB recreation opportunities available	No. of NB recreation opportunities
Socio- cultural Soluti ons	Knowledg e and Social Capacity Building	Increased citizen involveme nt in environme ntal education al activities;	4	VS3	17	7,1 3	No of new informatio n channels generated between public institutions & citizenship	Social	No of new information channels generated between public institutions & citizenship	No of new information channels

				VS4, VS3	17,18	7,5	Social values for urban ecosystems and biodiversity	Social	Counting visitors in summertime and compare it with visitors with the interventions completed	number of visitors
		Support social learning regarding ecosystems and their functions:	4	VS3, VS4	17,18	7,4	Perceptions of citizens on urban nature	Social	Counting visitors on net-based information board	number of visitors
	Participatory Planning and Governance	Increased openness of participatory processes	3	VS3	17	7,14	No civil society entities that have participated in the execution of the project in relation to the total of entities with presence in the neighbourhood	Social	No civil society entities that have participated in the execution of the project in relation to the total of entities with presence in the neighbourhood	%
		Boosted empowerment;	3	VS3, VS4	17,18	7,8	Citizen participation in and co-creation of the design, implementation and evaluation of project interventions	Social	No. of people participating to development and delivery of interventions (No. of people who represent themselves as citizens)	No. of people / year
				VS3	17	8,5	Personal and social background of people who participated in the project's activities	Social Justice	no. of people per category (age, education level, profession, ...)	no. of people per category
		Public-private partnership activated;	4	VS1, VS2, VS3, VS4	16,17, 18	10, 9	Public / Private Investments in the 5 years of the project	Economic	Public Private Investments the end of project	Euros
	Social Justice and Social Cohesion	Inclusion of different social groups in NBS projects	5	VS3	17	8,7	Participation of entities representing groups of persons with	Social Cohesion	% of entities representing groups of persons with functional disabilities with respect to the	%

							functional disabilities		total number of entities of this type that have participated in the project activ.	
							Participatio n of individuals with functional disabilities	Social Cohesion	Average number of individuals with functional disabilities using facilities & participating in the activities carried out under the project per unit time	No. of individuals / year
							Accessibilit y of open public spaces and buildings for families with baby carriages and individuals with restricted mobility	Social Cohesion	No. of accesses of families with baby carriages and individuals with restricted mobility	No. of accesses to people with physical limitations
							Number / share of people being physically active (min. 30 min 3 times per week)	Indicators related to physical activity	Number / share of people being physically active (min. 30 min 3 times per week)	No of people / %
							Increase in walking and cycling in and around areas of interventions	Indicators related to physical activity	No. of people and average time spent in walking and cycling in and around areas of interventions	No. of people / hours per week per capita
							Improved motor skills among the youth	Health indicators related to physical activity		
							Feeling of improving the quality of life (the Quality of Life questionnaire)	Psychologi cal	Quality of Life questionnaire	Scales' scores
							No. of jobs created; gross value added	Economic	No. of jobs created; gross value added	No. of jobs created; Euros

	Green Jobs			VS1 VS2	16,17	10,5	Definition of parameters for (re)designing of green public spaces based on the well-being of users	Economic	yes/no (parameters have been defined or not, to which degree, ...)
	Integrated Planning, Policies and Regulations	Innovation in processes and decision-making	3	VS1 VS2	16,17	10,6	Replication of solutions	Economic	yes/no (NBS have been replicated elsewhere or not, where, to which degree, ...)
				VS3	17	7,6	Inter-departmental collaboration leading to NBS designs for multi-functionality	Social	Diversity of stakeholders involved in co-creation No. persons/entities
				VS3	17	7,9	Institutional learning concerning acquisition of knowledge and understanding	Social	Qualitative assessment N/A
		Institutional relationship and networks created:	4	VS3	17	7,7	Improved coordination of NBS strategies within and across levels of governance	Social	Qualitative assessment N/A
				VS2, VS5	17	1,3	Measures of human comfort	Temperature reduction	Physiological Equivalent Temperature (PET), Predicted Mean Vote (PMV) various
Digital solutions	Environmental monitoring	Data driven development strategies for temperature monitoring	4	VS1, VS5	16,17	5,5	Physical air quality indicators: temperature, humidity, etc.	Environmental	average measured temperature and humidity (monthly, annual) °C, %
		Data driven development strategies for air monitoring		VS1, VS5	16,17	5,6	Chemical air quality indicators	Environmental	annually average concentrations of SO2, NOx, PM2.5, PM10, O3, CO, NH3, Cl, CO2, organic µg of pollutant m-3, others (for each species)

										substances (including PAH)
	Digital participation	increased e-participation	5	VS4, VS3	17,18	7,5	Social values for urban ecosystems and biodiversity	Social	Counting visitors in summertime and compare it with visitors with the interventions completed	number of visitors
				VS3, VS4	17,18	7,4	Perceptions of citizens on urban nature	Social	Counting visitors on net-based information board	number of visitors
				VS3, VS4	17,18	7,8	Citizen participation in and co-creation of the design, implementation and evaluation of project interventions	Social	No. of people participating to development and delivery of interventions (No. of people who represent themselves as citizens)	No. of people / year
				VS3	17	7,11	Number of individuals that is aware of the project's objectives, content and processes	Social	no/share of individuals/participants that know the project (All participants in activities and meetings, project communication and dissemination tasks)	no./% of individuals/participants
	Health and Wellbeing monitoring	Level of outdoor physical activity improved	3	VS5	17	9,19	Increase in walking and cycling in and around areas of interventions	Indicators related to physical activity	No. of people and average time spent in walking and cycling in and around areas of interventions	No. of people / hours per week per capita

Annex II – Theory of Change Infographics per pilot

(refer to the following infographics)





CASTELFRANCO VENETO, ITALY

FUNDING STAGE

VS OBJECTIVES



VS GROUP 1

1. RECONNECT THE CITIZENS TO THE VILLA BOLASCO GARDEN AND ITS NATURALISTIC AND BIODIVERSITY VALUE BY INCREASING PHYSICAL ACCESSIBILITY AND DIGITAL ENJOYMENT.
2. INCREASE CITIZENS' AWARENESS OF THE BENEFITS OF URBAN GREEN AND BLUE AREAS.
3. STRENGTHEN THE PARK'S ROLE AS A HUB FOR RESEARCH AND EXCHANGE OF BEST PRACTICES IN TERMS OF GREEN AREA PLANNING, AND STRENGTHENING ACTIVE CITIZEN PARTICIPATION IN PLANNING AND PRESERVING THE LOCAL LANDSCAPE.



VS GROUP 2

1. EXAMINE THE EFFECTS OF EXPOSURE TO GREEN AND BLUE SPACES ON PSYCHOLOGICAL WELL-BEING AND QUALITY OF LIFE OF YOUNG PEOPLE AND ELDERS
2. MONITOR AND INVESTIGATE THE RELATIONSHIP BETWEEN BEHAVIOUR, PHYSIOLOGICAL SIGNALS AND EXPOSURE TO NATURAL ENVIRONMENT IN OLDER ADULTS WITH DEMENTIA.

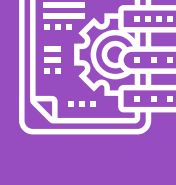
INPUTS



CHALLENGES/PROBLEM TO BE SOLVED

Physical Inaccessibility to the historic Garden. Lack of sense of belonging of the garden to the local community due to limited public opening, and therefore limited knowledge on its the naturalistic and biodiversity value. Lack of a physical hub for both technicians and citizens for urban public spaces decision making.

Quantification of psychological, behavioral and physiological effects of exposure to nature.



VS TYPE (SOCIAL, CULTURAL, DIGITAL, NBS)

Social, Cultural, Digital, NBS

Social, Digital

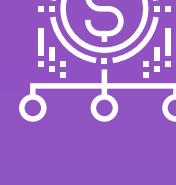


EXPERTISE/KNOWLEDGE OF PEOPLE INVOLVED (PILOT TEAM AND STK INVOLVED)

Ex (internal pilot): Urban Architects, Urban Planners, Cultural Practitioner, Biologist, Environmental Engineer, Agriculture and Environmental conservation experts/ professors, Sociologists

Local citizens, Psychologists, Physicians, Researchers

Ex (outsourcing): Cultural facilitator, local associations

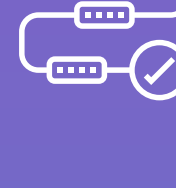


INVESTMENT PER VS GROUP

€146.253,81

€ 88.506,93

ACTIVITIES



IMPLEMENTATION OF VISIONARY SOLUTIONS (TITLES)

VS 1

Creation of garden access routes to ensure an improved access according to the needs of the garden users

VS 2

Analysis and monitoring of psychological and physiological well-being for elderly people and people affected by Alzheimer

VS 3

Full monitoring of micro-climatic conditions in the different areas of the garden (forest area, open area, lake area)

VS 4

Development of a green public spaces (re)design toolbox and establishment of the "Local observatory on therapeutic effects of the landscape"

VS 5

Implementation of ICT tools to support a rewarding experience of garden users & for the assistance of visitors with disabilities with the goal of increasing safety while visiting the garden

VS 6

Adaptive & intelligent visitor information systems



CO-CREATION WORKSHOPS

CO-IDENTIFICATION (WP4)

- Establishment of Labolasco
- 1st Co-creation workshop
- 2nd Co-Creation Workshop
- Workshop with international students of the Erasmus+ project WildSkillsEU
- Workshop with Veneto Regional Network of Local Landscape Observatories

CO-DESIGN (WP4)

- 3-day Hackathon at Villa Revedin Bolasco with Arduino technology (2024)
- Hackathon at Villa Revedin Bolasco on environmental protection and programming (2023)

CO-IMPLEMENTATION (WP4/6)

- Town Hall Event in Castelfranco Veneto - Festival VARCITIES

CO-EVALUTION (WP4/7)

- SROI (WP7)
- Partner Cities Webinar (WP9) / September 2024
- H&WB Platform Feedback Workshop (WPS) / September 2024
- GoNature Game Exhibition to collect feedback (WPS)
- VS Exploitation Workshops (WP8) / 6-7.06.2024



SOCIO-CULTURAL EVENTS

PILOT-SPECIFIC SOCIO-CULTURAL ACTIVITIES

- Launch of the new city pedestrian pathway (VS1) and the totem (VS5) / September 2024
- Vision Garden Expo / October 2024



KPI CHALLENGES

1. Climate Mitigation & Adaptation
4. Green Space Management
5. Air/Ambient Quality
6. Urban Regeneration
7. Participatory Planning & Governance
8. Social Justice & Social Cohesion
9. Public Health & Wellbeing
10. Potential for New Economic Opportunities & Green Jobs

1. Climate Mitigation & Adaptation
4. Green Space Management
9. Public Health & Wellbeing
10. Potential for New Economic Opportunities & Green Jobs

OUTPUTS

Access routes to the garden, Data gathering through sensors, (Re)design toolbox and research on therapeutic effects of the garden, ICT tools for increased accessibility of people with disabilities, Totem installation as an information tool for visitors

Research on the psychological and physiological well-being for elderly people and people affected by Alzheimer

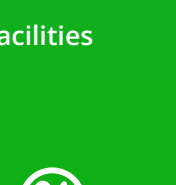
OUTCOMES



KPI EVALUATION OUTCOMES

- Increased recreational and cultural value of green spaces
- Increased share of pedestrian areas
- Accessibility of public spaces and buildings for families with baby carriages and individuals with restricted mobility
- Reduced urban temperature
- Improved human comfort
- Increased temperature and humidity data
- Enhanced data on singing birds
- Increased air quality data
- Reduced noise levels
- Increased governance coordination
- High replicability
- Increased elderly institutions
- Increased social values for urban ecosystems and biodiversity
- Openness of participatory process
- Fair participation
- Increased health and wellbeing
- Increased use of facilities

- Fair participation
- Greater inclusion of people with functional disabilities
- Increased recreational attachment and satisfaction
- Increased data on behavioural and psychological symptoms in dementia
- Improved health and wellbeing
- Improved cognitive abilities
- Enhanced sense of place and restorativeness
- Reduction in anxiety levels
- Increased data on human comfort
- Increased temperature and humidity data
- Increased use of green space facilities
- Reduced loneliness



SROI OUTCOMES

- Increased ecosystem knowledge, active citizenship, increased accessibility (to facilities), improved visiting experience, improved social connections, improved sense of belonging, Improved sense of belonging, improved wellbeing, stress reduction



CHANIA, GREECE

FUNDING STAGE

VS OBJECTIVES

VS GROUP 1

1. GATHER ENVIRONMENTAL, BIODIVERSITY & HEALTH DATA
2. INCREASE CITIZENS' PRODUCTIVITY
3. INCREASE COMMUNITY ENGAGEMENT AND SOCIAL INTERACTION
4. INCREASE CITIZENS' ENVIRONMENTAL AWARENESS
5. INCREASE CITIZENS' CREATIVITY, STRENGTHENING IDENTITY, AND BUILDING CONNECTIONS
6. STRENGTH LOCAL ECONOMY

VS GROUP 2 - SENSOR ON BIKES AND BIKE STATIONS

1. GATHER ENVIRONMENTAL, BIODIVERSITY & HEALTH DATA
2. INCREASE CITIZENS' ENVIRONMENTAL AWARENESS

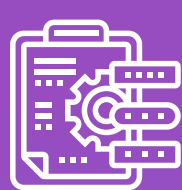
INPUTS



CHALLENGES/PROBLEM TO BE SOLVED

1. Lack of environmental and health data (Objective 1)
2. Unsustainable urban design (Objective 1)
3. Insufficient green space usage (Objectives 1-6)
4. Inadequate accessibility to education and work facilities within natural settings, social & cultural activities and local products exhibitions. (Objectives 2, 3, 5, 6)
5. Lack of environmental awareness (Objective 4)

1. Lack of environmental and health data (Objective 1)
2. Unsustainable urban design (Objective 1)
3. Lack of environmental awareness (Objective 2)



VS TYPE (SOCIAL, CULTURAL, DIGITAL, NBS)

Social, Cultural, Digital, NBS

Social, Digital



EXPERTISE/KNOWLEDGE OF PEOPLE INVOLVED (PILOT TEAM AND STK INVOLVED)

Architect/ Engineer, Researcher, IT expert, Surveyor, SSH disciplines (psychologist, sociologist, archaeologist, artist, lawyer, educator, economist), Communication expert, Municipal project officer.

Architect/ Engineer, Researcher, IT expert, Surveyor, SSH disciplines (psychologist, sociologist, archaeologist, artist, lawyer, educator, economist...), Communication expert, Municipal project officer.



INVESTMENT PER VS GROUP

€270,000

€30,000

ACTIVITIES



IMPLEMENTATION OF VISIONARY SOLUTIONS (TITLES)

VS 1

Mobile Urban Living Room

VS 2

Sensors on Bikes and Bike Stations



CO-CREATION WORKSHOPS

Co-Identification WS

Co-Design WS

Co-Design Webinar

Co-Implementation WS

Co-Evaluation WS

SROI WS

Follower Cities Webinar

2 Clustering Events for replication potential

Flash Survey for latent needs

H&WB Platform Usability Testing Survey



SOCIO-CULTURAL EVENTS

Event dedicated to Environment & Culture

Event dedicated to Education

Event dedicated to Physical Exercise



KPI CHALLENGES

1. Climate Mitigation and Adaption
2. Water Management
4. Green Space Management
5. Air/ambient quality
6. Urban Regeneration
7. Participatory planning and governance
8. Social justice and social cohesion
9. Public health and wellbeing
10. Potential for new economic opportunities and green jobs

1. Climate Mitigation and Adaption
5. Air/ambient quality
7. Participatory planning and governance
8. Social Justice and social cohesion
9. Public health and wellbeing
10. Potential for new economic opportunities and green jobs

OUTPUTS

MULaR

Bicycle stations, Bicycle sensor installation

OUTCOMES



KPI EVALUATION OUTCOMES

Increased green-related social service provided to population
Added job opportunities
High replicability
Definition of parameters for (re)design of public spaces
Increased public/private investments
Increased and improved participation
Fair participation
Increased awareness of urban ecosystems
Energy savings
Increased recreational or cultural value of green spaces
Increased accessibility to cultural and recreational facilities
Increased data on: healthcare spending, carbon storage/sequestration in vegetation, temperature and humidity, avoided run-off, total vegetation cover and tree species composition, air quality, health and wellbeing

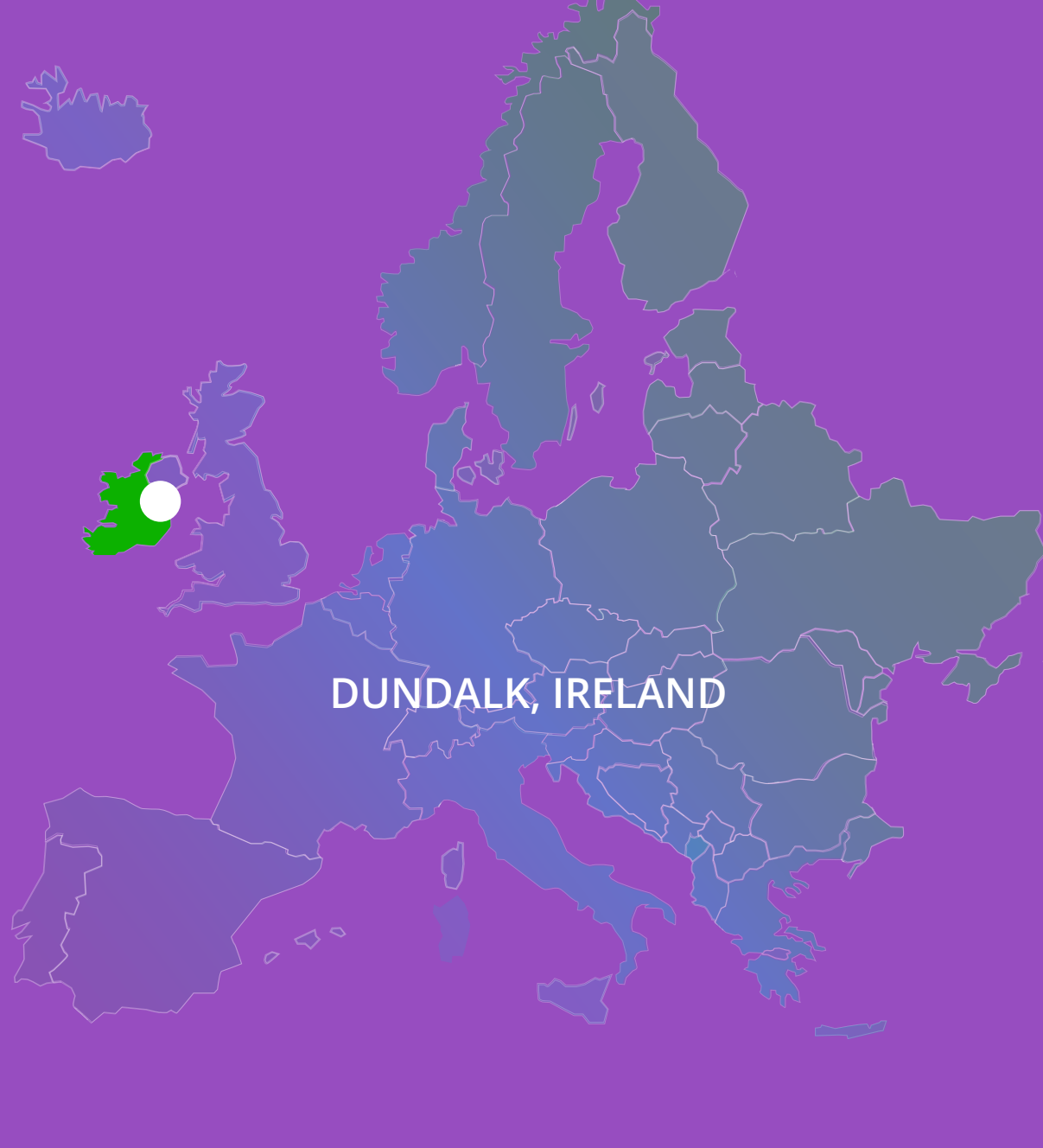
Increased awareness of urban ecosystems
Increased and improved participation
Fair participation
Increased awareness of urban ecosystems
Increased data on: temperature and humidity
Air quality
Noise pollution exposure
Outdoor physical activity
Healthcare spending



SROI OUTCOMES

Community engagement, cultural events, green spaces, energy sustainability, ecosystem knowledge, belonging and trust, environmental awareness, resilience, participatory decision-making

Health and wellbeing, belonging and trust, resilience, participatory decision making



DUNDALK, IRELAND

FUNDING STAGE

VS OBJECTIVES

VS GROUP 1

1. PROVIDE A SHELTERED OUTDOOR LEARNING SPACE THAT CAN BE UTILISED FOR A LARGE RANGE OF USES AT THE LIBRARY AND MUSEUM QUARTER
2. ENHANCE GREEN SPACE MANAGEMENT
3. MEASURE AND GATHER AIR AND AMBIENT QUALITY
4. AUGMENT URBAN REGENERATION, SOCIAL JUSTICE AND SOCIAL COHESION
5. ENRICH PUBLIC HEALTH AND WELL BEING
6. PROVIDE ECONOMIC OPPORTUNITIES AND GREEN JOBS
7. BOOST SECURITY IN THE AREA BOTH THROUGH CCTV AND PASSIVE SURVILLANCE

VS GROUP 2

1. GATHER ENVIRONMENTAL, BIODIVERSITY & HEALTH DATA
2. INCREASE CITIZENS' ENVIRONMENTAL AWARENESS WITH REGARD TO CLIMATE CHANGE MITIGATION AND ADAPTATION
3. ENHANCE GREEN SPACE MANAGEMENT
4. GATHER DATA ON AIR/AMBIENT QUALITY, AUGMENT URBAN REGENERATION, SOCIAL JUSTICE AND SOCIAL COHESION
5. ENRICH PUBLIC HEALTH AND WELL BEING, PROVIDE FOR THE POTENTIAL OF ECONOMIC OPPORTUNITIES AND GREEN JOBS
6. THE OBJECTIVE OF THE OUTDOOR URBAN GREEN LEARNING AND SENSORY GARDEN IS THE ENHANCEMENT OF HEALTH AND WELLBEING. THIS WILL BE ACHIEVED THROUGH INCREASED SENSE OF SAFETY, RECREATION, RELAXATION, REDUCTION OF STRESS FOR THE VISITORS

VS GROUP 3

1. INCREASE CITIZENS' ENVIRONMENTAL AWARENESS WITH REGARD TO CLIMATE CHANGE MITIGATION AND ADAPTATION, USING THE DATA GATHERED
- 2 - POLLUTION REDUCTION AND REDUCED RELIANCE ON CARS IN CITIES
3. ENRICHMENT OF GREEN SPACE MANAGEMENT
4. GATHERING AIR/ AMBIENT QUALITY
5. DEVELOP A GREATER AWARENESS AND SUPPORT OF PUBLIC HEALTH AND WELL BEING FOR CYCLISTS.

INPUTS

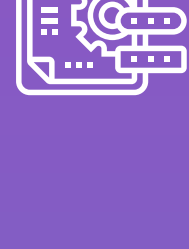


CHALLENGES/PROBLEM TO BE SOLVED

1. Unsustainable urban design (Objective 1, 2, 4)
2. Insufficient green space usage (Objectives 1-7)
3. Lack of environmental and health data (objective 3)
4. Insufficient accessibility to education and work facilities within natural settings, social & cultural activities and local products exhibitions. (Objectives 1, 2, 4, 5, 6, 7)
5. Lack of environmental awareness (Objective 6)

1. Lack of environmental and health data (Objective 1)
2. Unsustainable urban design (Objective 1, 2, 3, 4)
3. Insufficient green space usage (Objectives 1-)
4. Inadequate outdoor seating areas, in a quiet space. (Objectives 2, 3, 5)
5. Lack of environmental awareness (Objective 1, 4, 5)
- 6 Insufficient spaces for those with sensory needs (Objective 2, 3, 5)

1. Lack of environmental and health data (Objective 1, 4)
2. Unsustainable urban design (Objective 2, 3, 5)
3. Lack of environmental awareness (Objective 1, 2, 3, 4, 5)



VS TYPE (SOCIAL, CULTURAL, DIGITAL, NBS)

Social, Cultural

Digital, NBS

Digital

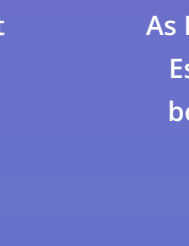


EXPERTISE/KNOWLEDGE OF PEOPLE INVOLVED (PILOT TEAM AND STK INVOLVED)

Building and Landscape Architects, Urban Planner, Engineer, Technician, Building Contractors, IT Expert, Municipality administrators, Surveyor, Archeologist, Electrician, Cultural Practitioner, Local Citizen, Educator and students, Politicians, Building Contractors, Health Professionals, Communication expert, Municipal project officer

Building and Landscape Architects, Urban Planner, Engineer, Technician, Building Contractors, IT Expert, Municipality Administrators, Surveyor, Archeologist, Electrician, Cultural Practitioner, Local Citizen, Educator and students, Politicians, Building Contractors, Health Professionals, Communication expert, Municipal project officer

Building and Landscape Architects, Urban Planner, Engineer, Technician, Building Contractors, IT Expert, Municipality Administrators, Surveyor, Archeologist, Electrician, Cultural Practitioner, Local Citizen, Educator and students, Politicians, Building Contractors, Health Professionals, Communication expert, Municipal project officer



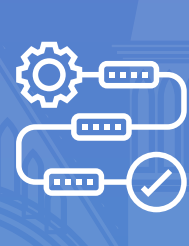
INVESTMENT PER VS GROUP

As Per LCCs Latest Cost Plan Best Estimate E.199,150.70 (LCC will be match funding to overcome overspend and enhanced components)

As Per LCCs Latest Cost Plan Best Estimate E.164,193.75 (LCC will be match funding to overcome overspend and enhanced components)

As Per LCCs Latest Cost Plan Best Estimate E.54,953.75 (LCC will be match funding to overcome overspend and enhanced components)

ACTIVITIES



IMPLEMENTATION OF VISIONARY SOLUTIONS (TITLES)

VS1

Creation of Outdoor Learning Pod between Dundalk Library & Museum Quarter to showcase the newest technologies and host shared functions

VS2

Outdoor Urban Green Learning and Sensory Garden for H&WB Sensory Cubbie

VS3

New Bike Stations and Sensors Bike-stations



CO-CREATION WORKSHOPS

- Co-Identification (WP4)
- Co-Design (WP4)
- Co-Implementation (WP4/6)
- Co-Evaluation (WP4/7)
- SROI (WP7)
- Partner Cities Webinar (WP9)
- H&WB Platform Feedback Workshop (WP5)
- GoNature Game Exhibition to collect feedback (WP5)
- VS Exploitation Workshops (WP8)



SOCIO-CULTURAL EVENTS

1. Event dedicated to education Varcities at Louth Science Festival Nov 2023 - The pilot team presented the three Visionary Solutions and explain how they will contribute to increase health and well-being in the area. Technical partner Dartek was also present to lead a demo of the GoNature Game
2. Event dedicated to Environment and awareness February 2024 VARCITIES at the SEAI Energy Clinic in Dundalk - LCC held a collaborative morning with Ireland's national sustainable energy authority (SEAI), with a variety of activities hosted as part of the Energy Clinic on the Pilot Site at Dundalk Library
3. TBC



KPI CHALLENGES

CHALLENGES VS GROUP 1

- 4 - Green Space Management
- 6 - Urban Regeneration
- 7 - Participatory Planning and Governance
- 8 - Social Justice and Social Cohesion
- 9 - Public Health and Wellbeing
- 10 - Potential for New Economic Opportunities and Green Jobs

CHALLENGES VS GROUP 2

- 1 - Climate Mitigation and Adaptation
- 2 - Water Management
- 4 - Green Space Management
- 5 - Air/Ambient Quality
- 6 - Urban Regeneration
- 7 - Participatory Planning and Governance
- 8 - Social Justice and Social Cohesion
- 9 - Public Health and Wellbeing
- 10 - Potential for New Economic Opportunities and Green Jobs

CHALLENGES VS GROUP 3

- 4 - Green Space Management
- 5 - Air/Ambient Quality
- 6 - Urban Regeneration
- 7 - Participatory Planning and Governance
- 8 - Social Justice and Social Cohesion
- 9 - Public Health and Wellbeing
- 10 - Potential for New Economic Opportunities and Green Jobs

OUTPUTS

Outdoor Learning Pod

Learning and Sensory Garden

Sensor-equipped bicycle station

OUTCOMES



KPI EVALUATION OUTCOMES

- Increased energy savings
- Increased recreational and cultural value of green spaces
- increased use of green public space facilities
- reclamation of building materials
- Accessibility to cultural facilities
- increased and improved participation
- greater inclusion of people with functional disabilities
- increased resources efficiency
- high replicability
- increased public/private investments

- Increased energy savings
- Reduction in water routed to drainage network
- Increased accessibility of urban green spaces
- Increased recreational and cultural value of green spaces
- Increased use of green public space facilities
- Increased urban biodiversity
- Added Value chemical air quality indicators
- Reclamation of building materials
- Increased accessibility of cultural facilities
- Increased and improved participation
- Greater inclusion of people with functional disabilities
- Reduced noise level
- Increased public & private investments
- High replicability

- Increased accessibility of urban green spaces
- Increased recreational and cultural value of green spaces
- Increased use of green public space facilities
- Chemical air quality indicators
- Reclamation of building materials



SROI OUTCOMES

Increase in socialisation, enhanced health and wellbeing, new business opportunities

Enhanced safety, increased sense of pride, increased sense of inclusivity

Increased use of bikes



FUNDING STAGE

VS OBJECTIVES

VS GROUP 1

1. INCREASE VEGETATION IN THE GŻIRA LOCALITY

2. BOOST COMMUNITY BUILDING, SENSE OF BELONGING AND MITIGATE NEGATIVE EFFECTS OF GENTRIFICATION

VS GROUP 2

1. REDUCE AIR AND NOISE POLLUTION, IMPROVE WALKABILITY AND GENERAL H&WB OF THE NEIGHBOURHOOD

2. BOOST CIVIC PARTICIPATION, SOCIAL RESPONSIBILITY, ENVIRONMENTAL AND SUSTAINABILITY AWARENESS

VS GROUP 3

1. INCREASE VEGETATION IN THE GŻIRA LOCALITY

2. BOOST COMMUNITY BUILDING, SENSE OF BELONGING AND MITIGATE NEGATIVE EFFECTS OF GENTRIFICATION

INPUTS

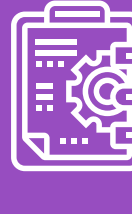


CHALLENGES/PROBLEM TO BE SOLVED

Lack of vegetation, lack of walkability, lack of shade for citizens waiting at the bus stop. Lack of public green space.

Poor air quality from high levels of congestion, lack of transparency around air pollution.

Lack of vegetation in local schools, lack of opportunity for outdoor learning.



VS TYPE (SOCIAL, CULTURAL, DIGITAL, NBS)

Social, Cultural, NBS

Digital

Social, Cultural, NBS



EXPERTISE/KNOWLEDGE OF PEOPLE INVOLVED (PILOT TEAM AND STK INVOLVED)

Landscape architect, Engineer, Science communicator, local citizens, artists, musicians, cultural practitioner, science communication academic.

Engineer, residents, tech provider, science communication academic.

Landscape Architect, educators, students, school administration, cultural practitioner, science communication academic.



INVESTMENT PER VS GROUP

€32,200

€10,000

35,960

ACTIVITIES



IMPLEMENTATION OF VISIONARY SOLUTIONS (TITLES)

VS 1

Rue D'Argens: Micro-greening Interventions through a Participatory Design Process

VS 2

Citizen Science on Air/Noise quality to increase H&WB awareness

VS3:

Urban Biodiversity, Education and Engagement through a Co-Created Community Garden Project



CO-CREATION WORKSHOPS

CO-IDENTIFICATION (WP4)

Co-Identification Workshops with Students and Teachers at St. Clare College
Co-Identification Workshops with Students and Teachers at Stella Maris
Co-Identification Stakeholder Workshop

CO-DESIGN (WP4)

Co-Design Workshops with Students and Teachers at St. Clare College
Co-Design Workshops with Students and Teachers at Stella Maris School
Co-Design Stakeholder Workshop

CO-IMPLEMENTATION (WP4/6)

Co-Implementation Workshops with Teachers and Students (VS3)
H&WB Platform Stakeholder Feedback Session during Co-Implementation Workshop (WP5)
Citizen Science Activity with Local Residents
Co-Implementation Stakeholder workshop

CO-EVALUTION (WP4/7)

Replication workshop with local Stakeholders
SROI (WP7)
Partner Cities Webinar (WP9)
H&WB Platform Stakeholder Feedback Workshop (WP5)
H&WB Platform Feedback Workshop (WP5)
VS Exploitation Workshops (WP8)
GoNature Game Feedback Sessions (WP5)
Co-Evaluation Stakeholder Workshop



SOCIO-CULTURAL EVENTS

3 Pop-up Parks (VS1)

Culture Garden (VS3)

GoNature Game Exhibition (Valletta Green Festival)

Science in the City Side-Events with Hands-on Activities



KPI CHALLENGES

1. Climate Mitigation and Adaptation

4. Green Space Management

5. Air/Ambient Quality

6. Urban Regeneration

9. Public Health and Wellbeing

10. Potential for New Economic Opportunities and Green Jobs

7. Participatory Planning and Governance

8. Social Justice and Social Cohesion

9. Public Health and Wellbeing

10. Potential for New Economic Opportunities and Green Jobs

4. Green Space Management

7. Participatory Planning and Governance

8. Social Justice and Social Cohesion

9. Public Health and Wellbeing

10. Potential for New Economic Opportunities and Green Jobs

OUTPUTS

3 Pop-up parks in Rue d'Argens, Bus stop micro-greening

Air quality sensors, citizen science activities

Outdoor learning space, soft landscaping in 2 schools, Co-design activities, Cultural event at Council of Europe gardens

OUTCOMES



KPI EVALUATION OUTCOMES

Increased carbon sequestration data

Increased data on outdoor presence

Increased outdoor physical activity/ (Increased of data gathering of data of people being physical active)

Parameters for (re)designing public spaces

High replication potential of Visionary Solutions

Increased data on healthcare spending

Improved quality of life

Increased residential attachment and satisfaction

Increased recreational and cultural value of green spaces

Increased urban biodiversity / increased ecosystem services

Increased and improved participation

Increased participation in citizen science activities

Fair participation

Greater inclusion of immigrants

Increased data from sensors

Increased number of air quality data

Increased data on noise

Increased and improved participation

Increased participation in citizen science activities

Fair participation

Greater inclusion of immigrants

Increased recreational and cultural value of green spaces

Definition of parameters for Parameters for (re)designing public spaces

Increased urban biodiversity

Increased accessibility of urban green spaces

Fair availability of green spaces and ecosystem services

Increased and improved participation

Increased participation in citizen science activities

Fair participation

Greater inclusion of immigrants

Definition of parameters for (re) designing green public spaces



SROI OUTCOMES

Biodiversity appreciation, psycho-emotional wellbeing, residential attachment and happiness

Awareness of air and noise pollution, understanding sensor usage, boosted civic participation and empowerment, residents' lifestyles choices, pollution reduction efforts, sustainable behaviour, connection to the local environment, science activities, improving students' engagement

Biodiversity awareness, enhanced aesthetic, enhanced wellbeing, boosted social interaction, career opportunities, learning experiences, co-design, sense of ownership



LEUVEN, BELGIUM

FUNDING STAGE

VS OBJECTIVES

VS GROUP 1

CREATE A MEETING PLACE FOR SOCIAL INTERACTION, MEASURE THE IMPROVEMENTS OF ADDING GREEN AND OPENING UP A TUBED-IN RIVER, ADD ELEMENTS IN PUBLIC SPACE THAT STIMULATE PEOPLE TO MOVE, MEASURE THE FLOWS OF PEDESTRIANS AND BIKES THAT COME FROM ADDING NEW PATHS FOR SLOW TRAFFIC

VS GROUP 2

USE SMART LIGHTING TO MEASURE NOISE AND NUDGE PEOPLE TO ADAPT THERE NOISE LEVEL

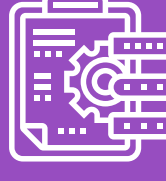
INPUTS



CHALLENGES/PROBLEM TO BE SOLVED

The pilot site is an island in the city with a completely paved surface. By creating open green public space we want to improve the conditions here for health and well-being of citizens.

Creating new public space attracts people that might make noise that bothers neighbours and impact their health and well-being. By pro-actively add noise sensors we can monitor this potential problem and use nudging techniques to mitigate nuisance.



VS TYPE (SOCIAL, CULTURAL, DIGITAL, NBS)

Social, Cultural, Digital

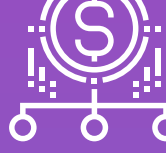
Digital



EXPERTISE/KNOWLEDGE OF PEOPLE INVOLVED (PILOT TEAM AND STK INVOLVED)

Architects, Artists, Landscape architects, Sports managers, Traffic specialists, Cultural Practitioner, Biologist, Local Citizen.

Sound specialist, Data engineer, ICT specialist, IoT provider, Smart City Expert, Local Citizen.



INVESTMENT PER VS GROUP

€220,000

€46,000

ACTIVITIES



IMPLEMENTATION OF VISIONARY SOLUTIONS (TITLES)

VS 1

Mobile urban living room

VS 2

Sensors for health and water measurements

VS 3

Health trail with the "moving wall" and therapeutic sensory pathfor the elderly

VS 5

Mobility sensors: measure the pedestrian and bike flows (sensors on bikes for measuring air quality/noise)

VS 1

IoT infrastructure for smart lighting and noise management



CO-CREATION WORKSHOPS

SROI (WP7)

Partner Cities Webinar (WP9)
H&WB Platform FeedbackWorkshop (WP5)

GoNature Game Exhibition to collect feedback (WP5)

VS Exploitation Workshops (WP8)

Co-Identification (WP4)

Co-Design (WP4)

Co-Implementation (WP4/6)

Co-Evaluation (WP4/7)



SOCIO-CULTURAL EVENTS

Inauguration

Schools and culture day

Argentijnse tango

Block 3

CirkL circusfestival

Presentation Nieuwstedelijk Theatre

Theatre piece Drie Eenakters

Guided walk

Assembly - Construction Camp

Neighbourhood drink



KPI CHALLENGES

1. Climate Mitigation and Adaptation

2. Water Management

4. Green Space Management

5. Air/Ambient Quality

6. Urban Regeneration

7. Participatory Planning and Governance

8. Social Justice and Social Cohesion

9. Public Health and Wellbeing

10. Potential for New Economic Opportunities and Green Jobs

7. Participatory Planning and Governance

9. Public Health and Wellbeing

OUTPUTS

MULaR (Olevodroom), Water quality sensors, Data on sustainable mobility

Smart lighting installation, Noise quality sensors

OUTCOMES



KPI EVALUATION OUTCOMES

Increased and improved participation
Reclamation of building materials

Increased accessibility of urban green spaces

Increased recreational and cultural value of green spaces

Increased connectivity to green infrastructure

Increased accessibility of sport and recreation facilities

Increased accessibility of cultural facilities

Greater inclusion of families with babies and individuals with restricted mobility

Fair participation

Increased data on outdoor presence

Improved health and well being

Increased data on health and wellbeing

Increased residential attachment and satisfaction

Increased job opportunities

Parameters for (re)designing green public spaces

Increased data on healthcare spending

Increased public & private investments

Increased data on water chemical parameters

Increased data on water physical parameters

Increased temperature data on human comfort

Increased temperature data

Number of temperature and humidity data added

Increased (physical) air quality data

Increased (chemical) air quality data

Increased data on noise pollution exposure
Improved quality of life

Increased residential attachment and satisfaction



SROI OUTCOMES

Increased cultural activities, community building, improved sense of ownership, healthier lifestyle, enhanced environmental awareness

Increased cultural activities, community building, improved sense of ownership, healthier lifestyle, enhanced environmental awareness



NOVO MESTO, SLOVENIA

FUNDING STAGE

VS OBJECTIVES

VS GROUP 1

BROWNFIELD REMEDIATION AND NATIVE VEGETATION PLANTATION

VS GROUP 2

CREATE SUSTAINABLE TRAILS AND OFFER INTER-CONNECTED RECREATIONAL OPPORTUNITIES

VS GROUP 3

CREATE INTEGRATED MANAGEMENT OF FACILITIES: IOT SOLUTIONS

INPUTS



CHALLENGES/PROBLEM TO BE SOLVED

Brownfield site that is gradually remediated and designed to serve as recreational park, opportunity of connection to the nearby Nature 2000 site with rich and bio-diverse environment.

Develop infrastructure and content solutions for enhancing opportunities of children and elderly to be involved in physical based activities; Connect facilities in the natural and infrastructural sense to gain better utilization of infrastructure and attract users.

Going beyond the initial scope of the area - integrate several types of activities to surpass monoculture of movement in just one mode (swimming, running...) through ICT solutions, IoT platform and digital tools.



VS TYPE (SOCIAL, CULTURAL, DIGITAL, NBS)

NBS, Cultural

Social, NBS, Cultural, Digital

Social, Digital



EXPERTISE/KNOWLEDGE OF PEOPLE INVOLVED (PILOT TEAM AND STK INVOLVED)

NBS experts, architects, urban planners, special groups (impaired) experts.

Physical education experts, health related experts, experts for visually and movement impaired, NBS experts, nature preservation experts, landscape architects.

Physical education experts, sports & training experts, IT experts, marketing & communication experts.



INVESTMENT PER VS GROUP

€34,000

€148,000

€90,00

ACTIVITIES



IMPLEMENTATION OF VISIONARY SOLUTIONS (TITLES)

VS 1

Brownfield remediation and greening with plant species indigenous to the nearby natura 2000 areas

VS 3

Interconnectedness of sports, recreational and therapeutic facilities (part of vs group 2 and part of vs group 3)

VS4:

Integrated management of the facilities

VS 5:

IoT solutions for measuring the health and well-being of users and visitors



CO-CREATION WORKSHOPS

Stakeholder Meeting on VS1 and VS2

First Co-creation Workshop - broad target groups
Second Co-creation Workshop - programmes
Town Hall Meeting
Co-creation workshop with health related experts
Partner Cities Webinar (WP9)
SROI (WP7)
H&WB Platform Feedback Workshop (WP5)
GoNature Game Exhibition to collect feedback (WP5)
VS Exploitation Workshops (WP8)

Stakeholder Meeting on VS4 - management



SOCIO-CULTURAL EVENTS

Swimming pool facilities opening & communication
Bike day / Voluntary work event
Physically impaired associations event with elevator presentation
Pistafest - Velodrome activities



KPI CHALLENGES

1. Climate Mitigation and Adaptation
4. Green Space Management
5. Air/Ambient Quality
6. Urban Regeneration
9. Public Health and Wellbeing
10. Potential for New Economic Opportunities and Green Jobs

7. Participatory Planning and Governance
8. Social Justice and Social Cohesion
9. Public Health and Wellbeing
10. Potential for New Economic Opportunities and Green Jobs

4. Green Space Management
7. Participatory Planning and Governance
8. Social Justice and Social Cohesion
9. Public Health and Wellbeing
10. Potential for New Economic Opportunities and Green Jobs

OUTPUTS

Greening of the area with indigenous species of trees and other green infrastructure; design of the area

Trim track and stations for physical exercises; programmatic content, special equipment for

Comprehensive ICT management system for centre as whole

OUTCOMES



KPI EVALUATION OUTCOMES

Increased (data on) carbon storage in and sequestration by vegetation
Increased (physical) air quality data
Increased (chemical) air quality data
Increased Nature Based recreation opportunities
Increased reclamation of contaminated land
Increased jobs opportunities
Increased public & private investments

Increased accessibility of urban green spaces
Increased Nature Based recreation opportunities
Increased temperature data on human comfort
Increased accessibility of urban green spaces
Increased recreational and cultural value of green spaces
Increased weighted recreation opportunities provided by Urban Green Infrastructure
Increased Nature Based recreation opportunities
Increased jobs opportunities
Increased public & private investments
Increased governance coordination for NBS
Increased jobs opportunities
Increased public & private investments
Increased institutional capacity
Increased Green-related social service provided to population
Increased and improved participation
Increased and improved participation
Fair participation to project activities
Greater inclusion of families with babies and individuals with restricted mobility
Improved quality of life
Increased air quality data
Increased data on outdoor physical activity
Increased data on quality of life

Increased governance coordination for NBS
Increased jobs opportunities
Increased public & private investments
Increased institutional capacity
Increased Green-related social service provided to population
Increased and improved participation
Fair participation to project activities
Greater inclusion of families with babies and individuals with restricted mobility
Improved quality of life

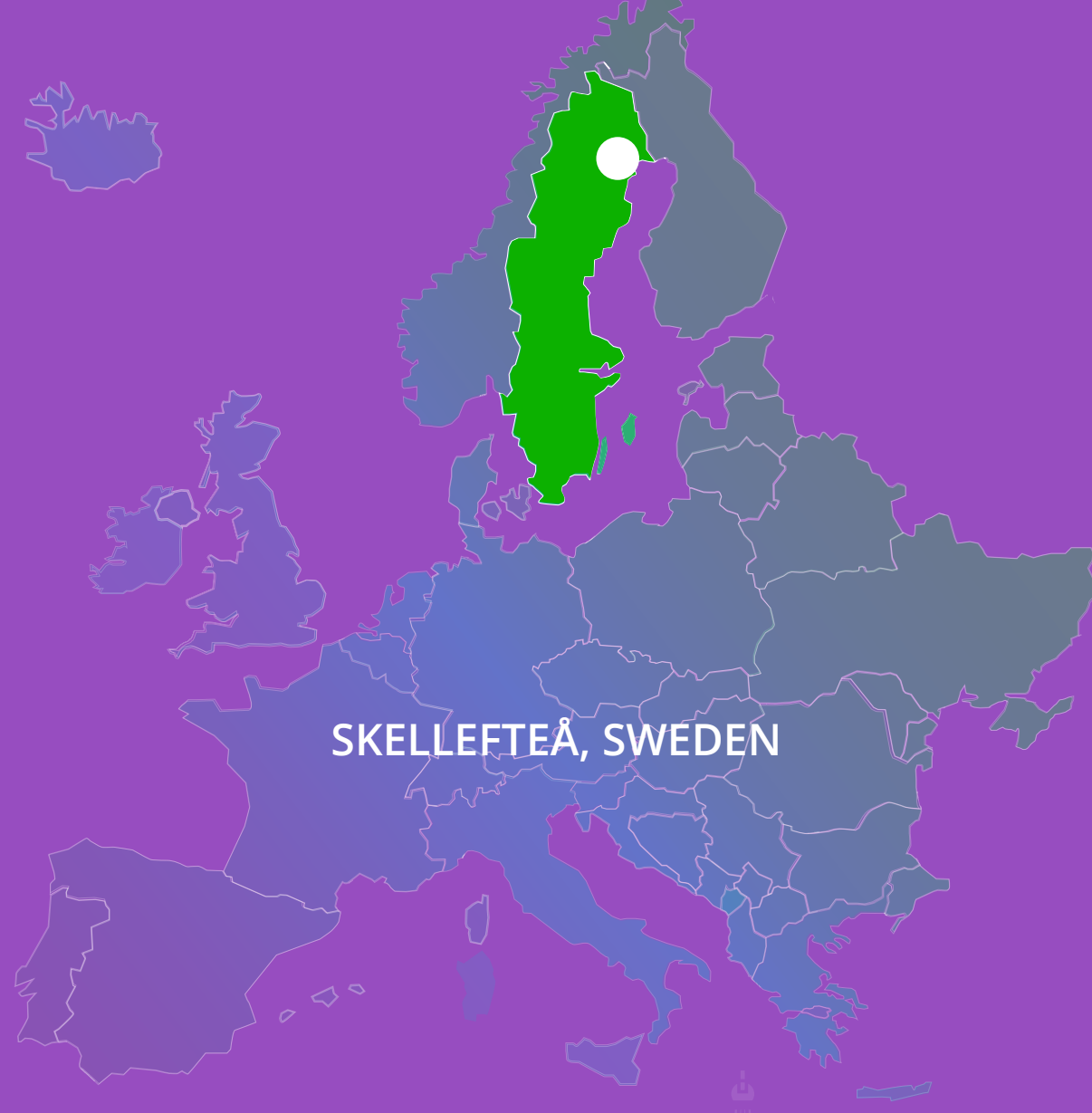


SROI OUTCOMES

Increased biodiversity awareness, increased recreational opportunities, improved health and wellbeing, improved physical health, improved community interactions, improved mental health

Increased biodiversity awareness, increased recreational opportunities, improved health and wellbeing, improved physical health, improved community interactions, improved mental health

Increased biodiversity awareness, increased recreational opportunities, improved health and wellbeing, improved physical health, improved community interactions, improved mental health



FUNDING STAGE

VS OBJECTIVES

VS GROUP 1

1. CREATE URBAN RESILIENCE
2. INCREASE BIODIVERSITY

VS GROUP 2

1. CREATE A (MORE) INVITING ENVIRONMENT
2. ENCOURAGE ACTIVITIES IN THE PARK

VS GROUP 3

1. EDUCATE CITIZENS TO INCREASE AWARENESS OF CLIMATE CHANGE
2. CREATE LEARNING SPACES IN THE PARK

INPUTS

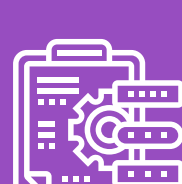


CHALLENGES/PROBLEM TO BE SOLVED

(risk of) Flooding of both park areas, streets and houses. Lack of biodiversity

Unlit areas of the park are inaccessible in dark autumn and winter times, unlit areas reduce activities in dark periods

Citizens are not aware of tangible effects of climate change, the park is not a suitable space for learning



VS TYPE (SOCIAL, CULTURAL, DIGITAL, NBS)

NBS

Digital

Social, Cultural

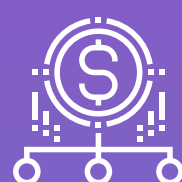


EXPERTISE/KNOWLEDGE OF PEOPLE INVOLVED (PILOT TEAM AND STK INVOLVED)

Park design and management, Landscape Architect, ecologists, water and infrastructure engineers (own personal and consultants), Allotment association, Swedish Society for Nature conservation, local citizens.

Park design and management, lighting engineers, IT staff, Skellefteå Kraft, electricians.

Park design and management, Landscape Architect, ecologists, educators, STEM facilitators, Illustrator, Swedish Society for Nature conservation, building architects.



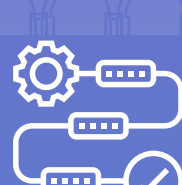
INVESTMENT PER VS GROUP

€47,000

€67,000

€100,000

ACTIVITIES



IMPLEMENTATION OF VISIONARY SOLUTIONS (TITLES)

VS 1

Build urban infrastructure to create urban resilience

VS3

Installation of smart lighting to contribute to an inviting environment and encourage activities in the park: Innovative lighting installations

VS4:

Educating & engaging citizens to level up their awareness of climate change and the importance of biodiversity

VS 2

Creation of a wetland bed to increase biodiversity

VS5:

Creation of space in the park with bee hotels/insect habitats, permanent school-material (school in nature, bee hotels)



CO-CREATION WORKSHOPS

Co-Identification (WP4)

Co-Design (WP4)

Co-Implementation (WP4/6)

Co-Evaluation (WP4/7)

SROI (WP7)

Partner Cities Webinar (WP9)

H&WB Platform Feedback Workshop (WP5)

GoNature Game Exhibition to collect feedback (WP5)

VS Exploitation Workshops (WP8)



SOCIO-CULTURAL EVENTS

Event in townhall with Stakeholders and Schools

Sapmi community event at the park



KPI CHALLENGES

CHALLENGES VS GROUP 1

2. Water Management
4. Green Space Management
6. Urban Regeneration
10. Potential for New Economic Opportunities and Green Jobs

CHALLENGES VS GROUP 2

5. Air-Ambient Quality
7. Participatory planning and governance
8. Social Justice and social cohesion
9. Public Health and Wellbeing
10. Potential for new economic opportunities and green jobs

CHALLENGES VS GROUP 3

4. Green Space Management
6. Urban Regeneration
7. Participatory planning and governance
8. Social Justice and social cohesion
10. Potential for new economic opportunities and green jobs

OUTPUTS

Natural infrastructure, including a wetland bed

Smart lighting

Bee hotels, Citizen education & engagement

OUTCOMES



KPI EVALUATION OUTCOMES

Reduction in water routed to drainage network / Reduced costs for sewerage treatment (2.7)

Increased reclamation of contaminated land (6.4)

Increased public & private investments (10.9)

Increased water retention capacity by vegetation and soil (2.2)

Improved surface water quality (2.6)

Energy savings from lighting upgrades and improvements (1.4)

Increased and improved participation (7.8, 7.11)

Increased and improved participation (7.8)

Fair participation to project activities (8.5)



SROI OUTCOMES

Reduced flooding risk, improved water management, increased biodiversity, new residents engaged, improved education

Increased safety and enhanced aesthetic, new residents engaged, improved education, sense of belonging

Improved education, increased community engagement, new residents engaged, sense of belonging