



D3.5: Guidelines for sketching of solutions

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Abbreviation list

| Term | Description |
|--------|--|
| B/C | Benefit-Cost Ratio |
| CA | Contracting Authority |
| CBA | Cost-Benefit Analysis |
| CEA | Cost-Effectiveness Analysis |
| CS | Consumer Surplus |
| CUA | Cost-Utility Analysis |
| CV | Compensating Variation |
| DPB | Discounted Pay Back |
| EC | European Commission |
| EIA | Environmental Impact Assessment |
| EU | European Union |
| EV | Equivalent Variation |
| GDP | Gross Domestic Product |
| GPP | Green Public Procurement |
| H&WB | Health and Well-Being |
| ICER | Incremental Cost-Effectiveness Ratio |
| IRR | Internal Rate of Return |
| IoT | Internet of Things |
| KPI | Key Performance Indicator |
| LCA | Life Cycle Assessment |
| NCFF | Natural Capital Financing Facility |
| NBS | Nature Based Solution |
| NPV | Net Present Value |
| OECD | Organization for Economic Co-operation and Development |
| PBP | Pay Back Period |
| PESTLE | Political, Economic, Social, Technological, Legal, Environmental |
| PPP | Public Private Partnership |
| PQQ | Pre-Qualification Questionnaire |
| SDG | Sustainable Development Goal |
| SPP | Sustainable Public Procurement |
| SPV | Special Purpose Vehicle |
| SROI | Social Return On Investment |
| SWOT | Strengths, Weaknesses, Opportunities, Threats |
| UN | United Nations |
| VfM | Value for Money |
| VS | Visionary Solution |
| WP | Work Package |
| WTA | Willingness To Accept |
| WTP | Willingness To Pay |



Executive Summary

Having faced the COVID-19 pandemic crisis and being aware of the need to cope with climate change adaptation and mitigation, cities are promoting new ideas, striving to implement inclusive co-design processes in the planning and designing of Visionary Solutions (VSs), and to rethink urban spaces in a healthier and more ecological way. The European Commission has defined Nature-Based Solutions (NBSs) as nature-inspired and supported solutions that simultaneously provide several benefits that help building resilience. On the other hand, another concept that has emerged in recent years is that of Smart City, defined as a place where traditional networks and services are made more efficient by the use of innovative technologies, digitalization of systems, including Internet of Things (IoT) devices. In this context, the Visionary Solutions based on urban digital transformation and nature-based actions, proposed by the VARCITIES project, aim to further implement the definition of NBS, proposing the resolution of well-known local urban issues by addressing them from a new perspective capable of combining technologies and/or experimenting innovative approaches. The objective of VARCITIES Work Package 3 (WP3) is to provide the common knowledge framework that is necessary to achieve integrated VSs designed to foster a significant increase in Health & Wellbeing (H&WB) in VARCITIES pilot cities. Within WP3, visionary ideas are further developed into feasible actions by following a participatory co-design process involving local stakeholders and assuming a “multiple benefits” perspective. The Visionary Solutions implementation requires not only a technical know-how, but also the mobilization of competencies and skills from across institutional sectors, in particular during the co-design phase, and the present deliverable D3.5 aims to provide guidelines for sketching effective VSs to be implemented. The document serve as a guidance not only for VARCITIES pilot leaders and their local partners, but also for cities and communities willing to develop similar solutions for citizens' H&WB. However, local administrations may suffer from the lack of skills, knowledge or human resources to implement effective actions and to guide local administrations along the co-creation path. For what has been said, this document presents the key steps to follow: from the definition of the objectives and desired results, to the work plan of the VS.

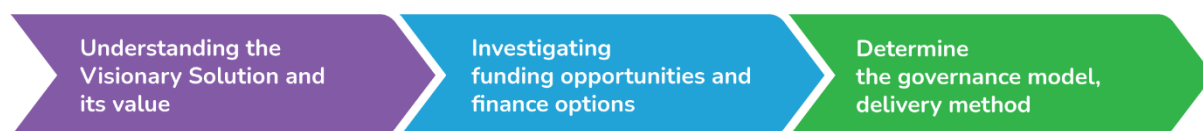


Figure 1 VARCITIES scheme for delivering Visionary Solutions

This process bridges the gap that usually exists between the original idea and the implementation phase where visionary ideas are strategically assessed and key phases, element, and responsibilities identified. This deliverable presents the key steps for the design of the Visionary Solutions: from the definition of the objectives, desired outcomes and the identification of partners and relevant stakeholders, to the design of the business model



canvas, the investigation of funding opportunities, the identification of the suitable governance model, and – finally – the VS workplan.



A step-by-step guide

An effective Visionary Solution implementation should follow some **key steps**:

Step 1: Clarify the **objective**

Step 2: Identify relevant **Stakeholders**

Step 3: Strategic **planning and assessment**

Step 4: Design the **business model**

Step 5: Investigate **funding and financing opportunities**

Step 6: Determine the **governance structure**

Step 7: Build an impacts **monitoring framework**

Figure 2 Key steps for the Visionary Solutions implementation

For each step, a descriptive text proposes questions to be answered, points of discussion, and potential approaches to be adopted; tips for the VARCITIES partners are also listed. Furthermore, to assess the value created by VSs, focus is placed not only on the traditional evaluation frameworks, but also on the use of Key Performance Indicators to monitor the multiple benefits provided by the solutions and their contribution to the local achievement of Sustainable Development Goals.

In conclusion the annexes contain information sheets and templates useful for the visual representation, management, and appraisal of the VS. Templates have been designed considering the experience gained by EURAC on innovative urban projects and latest available knowledge developed at European level to provide technical assistance to cities [1] A deeper investigation of some steps laid down in this deliverable is assigned to other project deliverables related to WP3 (e.g. D3.3 and D3.4) currently being developed.

1 What does sketching of Visionary Solutions mean?

Having experienced the COVID-19 pandemic crisis and becoming aware of the need to cope with climate change adaptation, cities are rethinking urban space, not only from the perspective of health but also ecology [2]. New ideas are emerging, recognizing the need to promote inclusive co-design processes in planning and designing visionary solutions, reshaping public spaces, and answering urgent needs. However, new brilliant ideas are not always clear from the beginning. They are sometimes closer to suggestions than to feasible actions.

Therefore, sketching them is the first action required, to kick off the process. It means roughly drafting the idea on paper or digital support and briefly describing the main characteristics in the attempt to bring it to life quickly. It is a great way to start brainstorming, to understand what details are still lacking and need to be further investigated, to preliminary explore the feasibility of the ideas (and eventually to take a step back or to reconsider some elements).

The objective of the sketch, the Visionary Solution (VS), derives from the VARCITIES project approach, which aims to establish sustainable models for increasing the health and well-being of citizens exposed to different climatic conditions and challenges. In this project, and throughout the document, a VS is defined as a local urban project, where an innovative hybridization between Nature-Based Solutions (NBS) and technology solutions is exploited in a bottom-up process to enhance the H&WB of citizens, also addressing social issues and cultural diversion [3].

A VS brings together traditional physical infrastructure or public space assets with new approaches to the use of natural elements in the urban environment, innovative technologies and sensors, mobility and connectivity or safety features. Its primary purpose is related to improving H&WB, but it is clear it also includes implications with local economic development, social justice and sociality, tourism, and environmental sustainability.

Because of its complexity and novelty, sketching a VS becomes a critical point, as it is the process of translating a project idea into an understandable language and visual output, in order to involve stakeholders in the process and to mobilize partners and resources needed for its implementation.

This deliverable, by providing guidelines, aims to fill the gap that usually exists between the original idea and the implementation phase. These guidelines have a twofold goal. Firstly, to serve as a resource for the VARCITIES pilot leaders and the respective local partners for the sketching of the VSs, based on a multiple-benefit approach and linked to the KPIs (Key Performance Indicators); to this aim some “tips and tricks” closely linked to VARCITIES structure are included in several sections. Secondly, to serve as a guidance document for ambitious cities and communities willing to develop similar solutions for H&WB of citizens.



The deliverable also provides background information for the refinement and appraisal of the solutions, to be developed during the co-design process, in between the conceptualization phase occurred during the project proposal preparation and the latter implementation phase (WP6) (see Figure 3). It should also serve as a reference document for interested actors, bringing the VS to an adequate readiness level for their implementation.

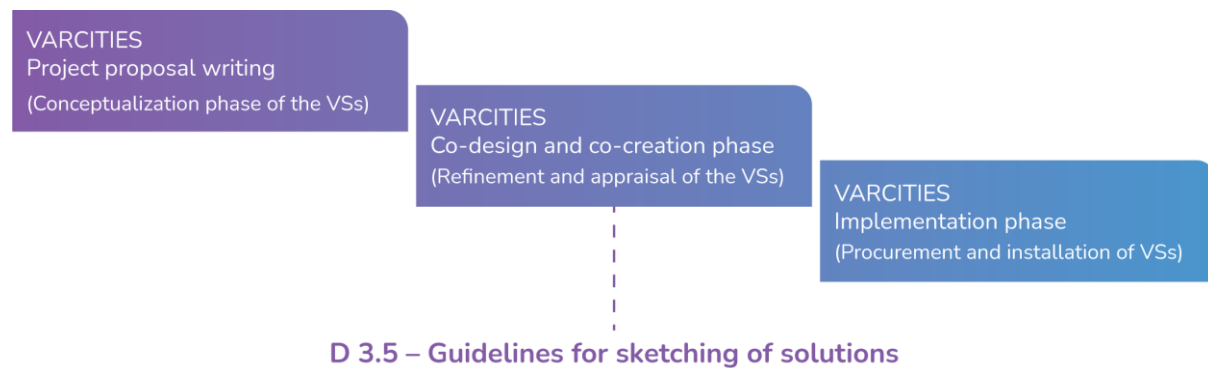


Figure 3: Positioning of the Deliverable 3.5 within the VARCITIES project Work Package Structure

The purpose of sketching the solution is to gather all relevant information required to assess the project in a simple and fast way, under the feasibility, managerial and financial perspective. It converts sustainability and smartness objectives into sound implementation packages and thus, facilitates the drafting of business models to implement and maintain the VS along its lifetime. By clearly explaining and communicating the main issues, roles, and responsibilities, also the most appropriate governance structure for each VS will become clearer and future possibilities to access funding for involved municipalities/local authorities and partners even more evident.

The guidelines are organized as follow:

- the descriptive text, explaining step by step the refinement procedure;
- Annexes: information sheets for the visual representation, management, and appraisal of the VS.



2 From suggestions to feasible projects, step by step procedure for delivering effective Visionary Solutions

Visionary Solutions are challenging by definition, because they aim to tackle a well-known issue from a new perspective, combining groundbreaking technologies and/or testing innovative approaches for the first time ever in a specific urban context or community. An effective Visionary Solution implementation should follow some key steps.



A step-by-step guide

An effective Visionary Solution implementation should follow some **key steps**:

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Step 5: Investigate **funding and financing opportunities**

Step 6: Determine the **governance structure**

Step 7: Build an impacts **monitoring framework**

Figure 4 Key steps for the Visionary Solutions implementation

Firstly, the promoter has to define the objectives and the desired outcomes, so involved partners and stakeholders can, on one hand, tailor their efforts toward those goals, on the other hand, contribute to reshaping the original idea, becoming active elements of the co-design process. To do this, a key point is for the promoter to be able to **present the suggestion clearly and convincingly**, avoiding gray zones or unclarity which may turn in unpleasant misunderstandings [4].

Secondly, **partners and stakeholders must be put in the position to freely express themselves**, providing suggestions, new ideas and even raising doubts or questions on the original proposal. By engaging them in the co-design and co-creation process the refinement of the original proposal will be done openly. Deviations from the concept should be seen as an enrichment and not as a distortion of it, while severe resistance by a specific involved group or stakeholder should be carefully considered and the reasons behind objectively analyzed. In the case of ideas in an early stage, the **impact mapping approach** may be suitable to find the right practical functions to be implemented [5].

Discussing with stakeholders is a good way to achieve a shared value proposition of the VS [6]. **What sort of value will the VS create** (directly or indirectly), and how might you capture and monetize that? Thanks to this reflection, it will be possible to start working towards the **definition of a business model, which will bring together the basic information required to pass from idea to implementation**. Do we have all the needed resources (monetary and non-monetary)? Whether and how will the visionary solution generate economic value? Eventually, what new value chains will arise from advanced technologies or innovative approaches/services locally developed? **Which governance model is required** to deliver and manage the VS?

An **inventory of existing assets that may be available for use** by the Visionary Solution should be compiled (these are the inputs different from monetary contribution), as well as **defining the funding and financial resources** [7].

You need to know **how the new technologies will be paid for**, and **who will bear that cost over time**. This means understanding the development, implementation and management costs, as well as determining to what extent the visionary solution will generate revenue and free cash flow [8].

Then, **the VS should pass the ex-ante assessment phase**, to ensure that the investment in it is worthwhile. Several evaluation techniques are available, based on different assumptions and leading to **different performance indicators to be considered by the decision-makers**. In the case of VS devoted to H&WB, the pure financial figure of a traditional Cost-Benefit analysis could be not enough representative, while the Social Return on Investment or the Cost-Effectiveness approach may offer other perspectives. It is a duty not only to do something, but firstly doing what works, and what works best; secondly increase the knowledge of what works, how it works, why it works, and for whom [9].

Strictly related to the discussion on impacts and expectations, as well as to assessment tools, is the **definition of Key Performance Indicators** and contribution to the local **achievement of Sustainable Development Goal (SDG)**. The complexity and innovation of the VSs will probably lead to much more benefits as expected in the inception phase, therefore a good **understanding of the multiple benefits** and an honest debate with the stakeholder may offer a new perspective to investors and the general public, helping in raising funds or gaining consensus [10].



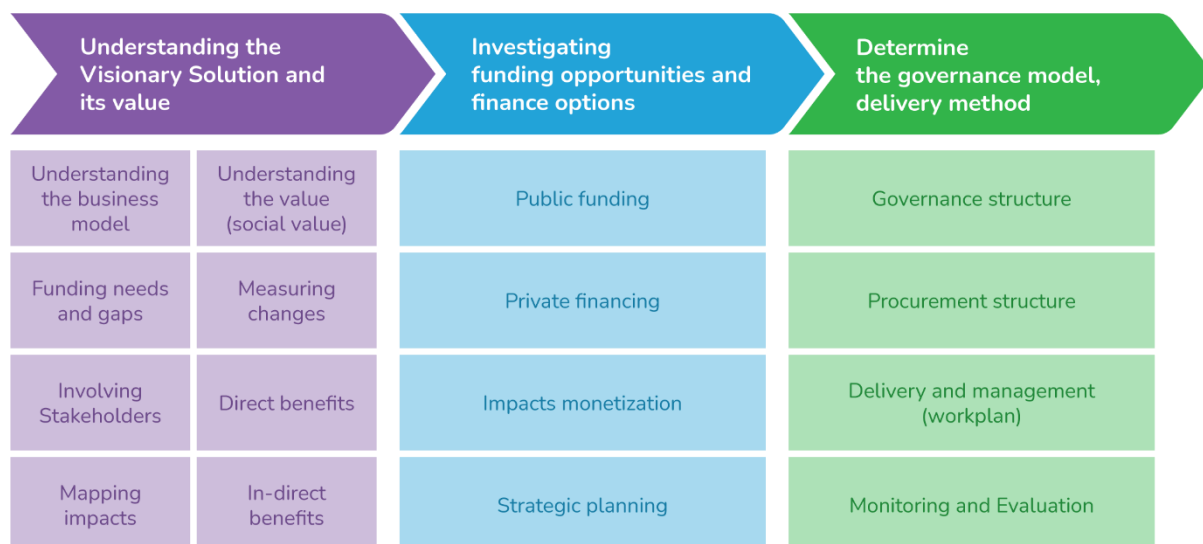


Figure 5: VARCITIES scheme for delivering Visionary Solutions

In fact, many urban and local governments face serious limitations due to limited budget and outdated existing infrastructure, shrinking their possibility to cope with current social and environmental challenges, thus reducing the quality of life of citizens, by exposing them to negative health outcomes [11].

Frontrunner cities around the world are forward-looking to implement visionary solutions that respond to complex challenges, but limited funds constrain initiative to a few demonstration sites, and funds that are channeled into one intervention will not be available elsewhere. Therefore, it is crucial cities are enabled to mobilize additional investments, gaining support both from private partners and non-profit organizations. This allows them to proceed towards the implementation of their visionary solutions, and support the achievement of ambitious local targets, because of contributing to the global Sustainable Development Goals [12]. Obviously, the arrival of private funding should not negatively affect the quality of the design process and the quality of the project at the expense of other groups or stakeholders.

An **adequate monitoring protocol** will ensure the correspondence between expectations and facts, helping in introducing corrective measures or reshaping actions if needed, **following the life cycle of the VS** [13].



3 Clarify objectives and values

3.1. Introducing the context

A brief description of the pilot city based on previously collected info is needed to contextualize the discourse and to share a few relevant data with stakeholders, engaging them in the debate and listening to their experiences, needs, and expectations (see Section 4).

This should be functional to support the vision that the city is willing to implement also considering how the set of Visionary Solutions will contribute to the general objectives. It is necessary to find consensus in problem formulation, toward eventually providing an overview on what other cities are going to do to tackle similar issues, describing how a general concept or a common problem could be operationalized at the local level.

The presentation of the context should embrace:

- General framework conditions, incl. relevant statistics and trends regarding the city/community economics, population, environmental aspects, etc.; and a social perspective on the context of the implementation of the project;
- Relevant (enabling) policy framework, including political objectives and/or commitments coming from spatial planning tools or local policies (e.g. Sustainable Energy and Climate Action Plans, etc.);
- The socio-cultural context in which the investment project is going to be developed (e.g. particular social connotations or relevant urban functions of the neighborhood), if relevant;
- Other relevant initiatives supported by the project promoter(s) or other investors that would be running in parallel to the Visionary Solution if any.

If available, describe the preparatory assessments and studies carried out in the course of the Visionary Solution preliminary development and summarize the performed analyses and conclusions/recommendations. Clear documentation helps to understand basic assumptions, default values and to evaluate results if reviewed after a while.

Tips for VARCITIES partners

Provide a brief description of the VARCITIES project. You may refer to the official website (<https://www.varcities.eu/>) as well as to the European database Cordis (<https://cordis.europa.eu/project/id/869505>).

More in general, you may refer to the Horizon 2020 call providing funding to this type of project (https://cordis.europa.eu/programme/id/H2020_SC5-14-2019) or other similar projects, such as:



- EuPOLIS – Integrated NBS-based Urban Planning Methodology for Enhancing the Health and Well-being of Citizens (<https://cordis.europa.eu/project/id/869448>);
- IN-HABIT – INclusive Health And wellBeing In small and medium-size cities (<https://cordis.europa.eu/project/id/869227>);
- GO GREEN ROUTES GO GREEN – Resilient Optimal Urban Natural, Technological and Environmental Solutions (<https://cordis.europa.eu/project/id/869764>).

Introduce the audience to the project, by explaining in simple words the meaning of recurrent topics and acronyms, trying to avoid the jargon.

| Common language of researchers and urban planners | Simple words statements (example) |
|---|---|
| Nature Base Solution (NBS) | Putting in place some trees and a water stream |
| Smart city | The light intensity will decrease when no one is on the sidewalk |
| Visionary Solution (VS) | When putting in place some trees and water stream we will install some sensors recording humidity and temperature |
| Pilot area | The place of the city where the project implementation will be seen |
| Pilot leader | The local municipal department / the local development agency / etc. |
| Key Performance Indicator (KPI) | The number of users that we would like to see using the new urban space to consider the project successful |

Describe the general context and rationale of the planned Visionary Solution, referring to info gathered by the D3.2 (WP3), as well as the decision background and general goals.

3.2. Objectives and the desired outcomes

A summary of the specific objectives of each Visionary Solution should be offered to stakeholders.

They have to clearly understand the specific context and current situation (status quo, without the visionary solutions), becoming familiar with the application area, and being aware of what has been already discussed.

Getting clarity around the ultimate objectives the VS is trying to achieve and the needs you are trying to address is a crucial first step. What are the key objectives? Why is the VS



proposed? What is already outdated and needs some changes? The objective should be defined according to the SMART acronym, which stands for Specific, Measurable, Achievable, Relevant, and Time-bound.

Try to explain in a single sentence the purpose of the VS as follows:

"The Visionary Solution provides _____ (a clear single action / a project) to _____ (your beneficiaries / target group) _____ over (the time period) in order to _____ (the overall outcome)."

The time of the VS should be consistent with the implementation and duration timeline (see Section 12).

The beneficiaries should be consistent with those involved in the co-design process (see Section 4).

The measurement of the outcome should be consistent with selected KPIs (see Section 11).



D 3.5 – Guidelines for sketching of solutions

Figure 6: Roadmap from VSs idea to implementation

Tips for VARCITIES partners

To kick-off the discussion and explore new opportunities, an effective approach could be to compare:

- the status quo (what is already there, without the visionary solution) to;
- what was written in the proposal (original description, aims, implementation timeline, available funding) to;
- what is now desirable to match the needs and wishes of the city/pilot area (main changes as of today, considering COVID-19 outbreak, elapsed time, changes in priorities or budget, etc.);
- potential investment required (could be an approximation) with relative impact (eg. high investment low impact may not be attractive).

Example table:

| | Status quo (without the VS) | Original VS (project proposal) | Desirable VS (as per today) |
|--------|-----------------------------|--------------------------------|-----------------------------|
| VS 1 | | | |
| VS 2 | | | |
| VS ... | | | |

This will ensure a better alignment between resources and needs, by considering possible changes in the framework conditions.

3.3. Visualize the VS in a clear and convincing way

Each VS should be presented concisely, making sure it is understandable at the first sight also by non-experts. It is critical to formulating the problem definition and objectives of Visionary Solutions in a way that makes sense and feels important to non-experts and stakeholders. Non-experts are often alienated by using expert language and academic jargon. They also typically frame problems in more direct and concrete ways. Experience shows that using concrete problems can be a good way to discuss more abstract challenges in groups of people from different sectors. Also, existing examples or at least comparable concepts/technologies and complementing written materials with visual materials including maps, icons, graphic suggestions, 3D rendering can help make problems more concrete and hands-on for non-expert stakeholders [14]. Easy visualization doesn't mean oversimplification or lack of relevant details; thus, this phase should be conducted with high professionalism by specialized staff. Further knowledge on smart approaches and digital urban transformation may be found at [15]–[19], while on NBS approach and integration in urban planning see among others [20]–[23].

Annex D provides a template to be used for effectively outlining a VS. Through this template key information concerning the type, scale, objectives of interventions are presented in a structured way, whereas detailed aspects related to investment, funding schemes, costs and revenues are described. Finally, expected impacts (especially in relation to SDGs) are listed. In addition to this, the Annex D also provides the Handout template for a more concise representation of the VSs.

Tips for VARCITIES partners

During the definition of the knowledge baseline of VARCITIES pilot cities (see D3.2) it emerged that the difficulty in clustering the city visions and VSs lies on the fact that in their description they are not broken down into their elementary components (e.g. Smart Solutions separated from NBSs). To proceed it is recommended to reformulate or classify again the VSs according to common criteria, breaking them down into their elementary components, to have a shared and clearer reference framework for their subsequent design, implementation, monitoring, and assessment.

The new taxonomy of VS encompasses the following categories and subcategories:

- Nature-Based Solutions [22]
 - Buildings Scale Interventions



- Public Spaces Interventions
- Interventions in Water Bodies and Drainage Systems
- Interventions in Transport Linear Infrastructures
- Interventions in Natural Areas and Management of Rural Land
- Interventions in Ecological and Habitat Biodiversity
- Smart City Solutions [23]
 - Sustainable Urban Mobility
 - Sustainable District & Built Environment
 - Integrated Infrastructure & Processes

VS implementation area: if any, specify the area, neighborhood, building or other location chosen for the implementation (based on graphical info provided in D3.2).

- Specific points,
- Routes/paths,
- Areas,
- In the case of “Knowledge / Awareness”, specify where they are going to be given in person (in case this is allowed by sanitary measure) or the app/software going to be used for the delivery of this service/action in the case on-line/ virtual activities.

Errore. L'origine riferimento non è stata trovata. provides a template for the visual representation of VSs based on VARCITIES case studies, which can be adapted to specific needs of other cities. The purpose of this template is to facilitate the co-creation process by providing a clear overview of the state-of-the-art in a given area of interest, (featuring maps, masterplans and representative photos), presenting the City's objectives along with the H&WB links, as well as the linked Visionary Solutions, with reference to the challenges addressed. Opportunities for co-creation are highlighted and sources of inspiration are given. The description of each Visionary Solution includes information on the specific challenges addressed, the different components foreseen, a preliminary budget as well as an implementation timeline.

3.4. Appoint dedicated people

Appointing a champion with clear decision-making authority (e.g. a chief innovation officer or equivalent leader) within city government and identifying an “ambassador” can streamline planning and aid in building key relationships. The ambassadors should be the “face” for the project in front of the public, who share the aims and objectives of the VS to embed an H&WB culture in the local community.





4 Identify partners and relevant stakeholders

The VARCITIES pilot leaders will engage stakeholders throughout the project, in particular during the co-identification, co-design, co-implementation, and co-evaluation of solutions (see D4.2 for the full strategy). Through a structured stakeholder mapping process in Work Package 4, pilots have mapped their relevant stakeholders along with a set of jointly agreed criteria (such as topical and demographic criteria) (see D4.1 for the description of this stakeholder mapping process). This includes both 'known' stakeholders but also enables the identification of 'blind spots' in a local community mapping. Finally, this criteria-structured mapping - following the Prospex-CQI method [24] - will be used to set a quota for each criterion, allowing us, in the preparation of co-creation activities, to monitor for and achieve diversity in the participant pool to these formats.

By applying the Prospex CQI method, the involvement of both the stakeholders who impact as well as the stakeholders who are affected by the implementation of certain (co-created) solutions is ensured. In addition, the method allows to go beyond the 'usual suspects' and takes into account the under-represented stakeholder groups (e.g. the heavily impacted stakeholders with a low level of influence themselves).

In light of designing, organizing, and moderating stakeholder engagement processes, focusing stakeholders' time and efforts in well-thought, time-defined, co-creation formats are crucial, to avoid stakeholder fatigue and sustain long-term engagement. Bringing a key diversity of stakeholders together for a more intersectional approach is another important step, for which the mapping exercise is useful. The mentioned engagement and co-creation formats can be complemented by others (e.g. consultations, interviews, focus groups, etc.), mostly in case certain groups during the process have not been reached, or when specific needs come to the fore [25].

It should also be considered what the different phases of the co-design imply. In some cases it has failed and led to negatively criticized public space interventions. It should be distinct that all involved groups and stakeholders are actively participating in the first phases of the project, when there is the "framing of the questions." After this part, multidisciplinary experts should proceed by conducting research and forming proposals. When the proposed ideas are well formulated and matured, they are communicated to receive constructive feedback from the rest of the stakeholders. Based on this feedback, the multidisciplinary experts continue the design process.

4.1. Leader, partners, and stakeholders

In any case, independently from the boldness of the process, some key issues should be clarified since the beginning, to avoid drift in the debate:

- Who is the leader of the VS, here understood as the institution or legal entity responsible for the implementation?



- Who are the decision-makers (those with legal rights to be considered in the decision-making process)?
- Who are the other involved partners and what is their role?
- Who are the stakeholders either contributing to the debate (providing suggestions and comments, free to come or leave at any time without any legal or formal implication) or either affected by the changes introduced by the VS (those experiencing positive/negative direct or indirect effects)?

This point should be further defined within a stakeholder mapping exercise, to categorize stakeholders, defining levels and power/trust relationships.

Proper identification of the involved actors and stakeholders is the basis to further discuss the expected impacts of the VS, as well as costs and benefits, and governance model. In some experiences related to smart city projects (see **Errore. L'origine riferimento non è stata trovata.**), close to the local government starting the project there is a circle of so called- strategic allies or co-initiators (i.e. those actively engaged in the co-design phase), while a second level circle encompasses the enablers (i.e. those involved in the implementation phase) [26].

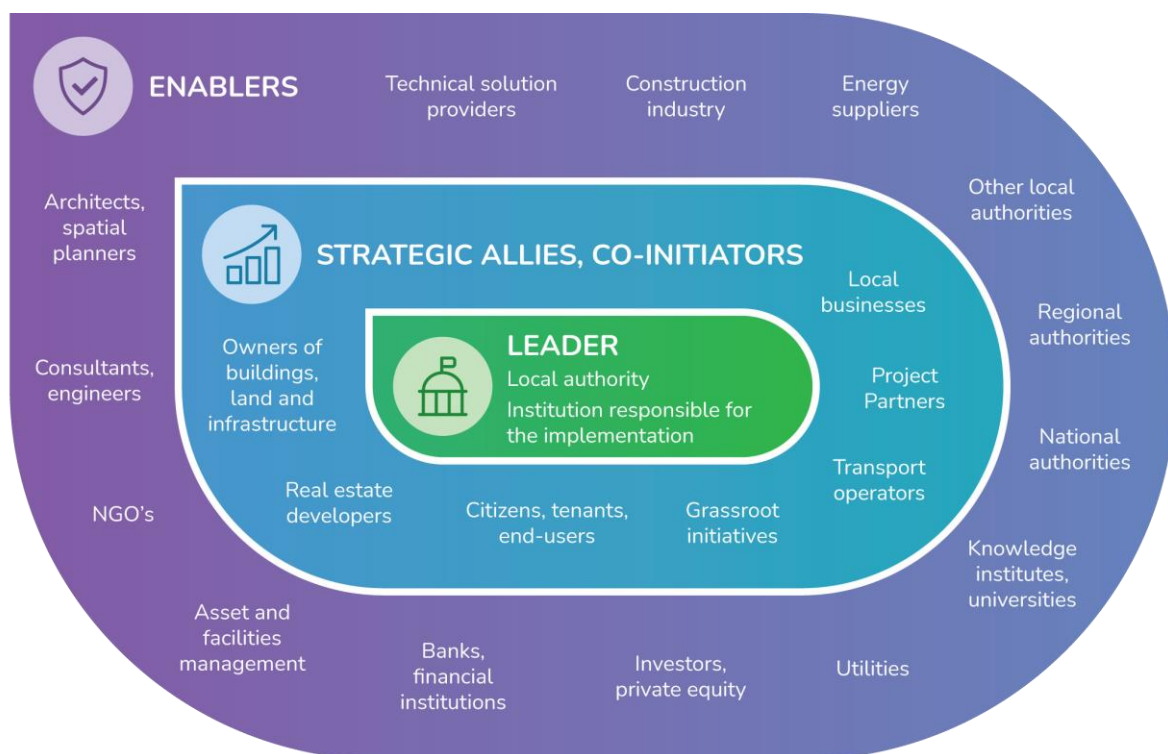


Figure 7: An example of a stakeholders map related to smart city projects (adapted from [26]).

To avoid misunderstandings in wording, a possible classification of the different actors on the scene could be:

- Beneficiaries: target group, users, those who will directly experience the outputs of the VS.

- Implementers: includes the project manager with the power of attorney (leader) and eventually other partners included in the decision making body (the suppliers and subcontractors or experts involved in the project);
- Stakeholders: those who provide support and a productive environment for implementation of the intervention, or on the contrary, may raise doubts and have some concerns about the project.
- Funders: those who finance the project.

It should be considered, that some changes in the categorization and wording are possible, according to the scope of the classification. For example, in the evaluation framework of Social Return on Investment, all groups experiencing an outcome are usually mentioned as stakeholders (regardless of their belonging to one of the before mentioned categories), by distinguishing those influenced by the action to those influencing the action. The difference between project output and outcome is that the output is an activity delivered while the outcome is the effect such activity brings to the stakeholder (improved well-being, satisfaction, sense of belonging, etc.). Some research [27] differentiates the output between hard and soft measures, where the first encompasses physical interventions on buildings, public spaces and infrastructure and the latter concerns delivering of training, capacity buildings, sensitization campaigns, etc.

Tips for VARCITIES partners

Identify and map:

- Main responsible partner (the VARCITIES partner who is in charge of implementing the VS, who coordinates or supervises the whole project, likely the “pilot leader”);
- Other VARCITIES partners involved and what’s their role (the “pilot experts” and “technology experts” linked to each pilot);
- Other involved stakeholders, not members of the VARCITIES consortium, and role;
- Beneficiaries, as people or organizations that experience change or affect the activity, whether positive or negative, as a result.

Stakeholder mapping exercise and engagement should follow the process designed by the dedicated work package (WP4).



4.2. Putting stakeholders in the position to freely express themselves

Changes of opinion, opposition, or questioning of solutions should be taken as an opportunity for enrichment of the participatory process, without prejudice.

Defining the rules of participation early on will help in avoiding poor attendance without commitment and subsequent lack of motivation, especially from those not having legal responsibilities or institutional mandate. For example, defining the participation in some introduction meetings, having a common discussion baseline, or asking to formally sign an expression of Interest could be among the criteria [28].

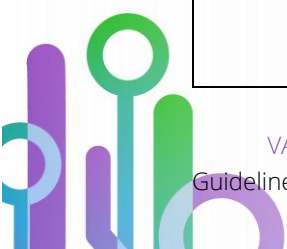
Adapting the concept of the originally designed VS in response to new information and viewpoints gathered in the co-design phase is exactly the purpose of this activity. This will determine the resources required for the implementation and the timeline, and it may mean you need to start with fewer activities.

Tips for VARCITIES partners

To kick off the co-creation process, the first stakeholders' workshop (WS1) should be dedicated to introducing the VARCITIES project & pilot site to stakeholders and to present and validate the first draft of solutions, and collect inputs to refine them.

Given this, the following points must be considered to maximize the output:

- Identify people and assign tasks for the different roles: moderator, note-taker, technical support person.
- Realize and deliver/study in advance the support documents for the different roles, i.e., detailed agenda and instructions for the moderator, template for the note-taker, hand-out document for participants, document for setting up digital tools, etc.
- Consider which kind of interactive tools (digital or not) you are going to use during the WS and, if needed, gain some background knowledge/experience on the different tools before the WS; if possible, look for information and user manuals.
- Provide some useful information sources for the moderators to help them understand what inputs you are looking for, and for assisting them in steering discussions, as well as asking specific questions to collect more in-depth comments.
- If possible, organize a rehearsal of stakeholders' workshop with pilot leaders to better understand if all the steps are clear enough, how to manage the time, what are the technical issues that can arise during the discussion, etc.



Expected results from VARCITIES WS1:

- The project & pilots are described to the stakeholders.
- The first drafts of visionary solutions are presented and validated; inputs are collected for the refinement of VSs.
- Inputs for PESTLE and SWOT analyses are collected, i.e., external and internal aspects (drivers, needs/wishes, challenges/barriers) that can affect the implementation of VSs (see Section 5).
- Inputs on stakeholder-driven KPIs are collected for the Monitoring & Evaluation framework (see Section 11).
- A first draft of the H&WB platform is presented and inputs are collected on it.
- Inputs on the stakeholders' preferred communication channels are collected.
- Feedback on the WS1 process is collected from stakeholders through an evaluation form (post-workshop phase).

Stakeholder engagement should follow the process designed by the dedicated work package (WP4) and supporting materials of Annexes D and E.

Needs and expectations are collected in D3.3 (Report on local barriers and drivers to the implementation of visionary solutions in pilots) and D3.4 (Report on multiple benefits expected from visionary solutions). Results of the co-design process are reported in D3.6 (Reports on the sketched solutions).

4.3. Building local support

When an ambitious or innovative project including VSs has local support, it is better positioned to attract additional partners. Community members and local not-for-profit institutions embrace projects that have clear H&WB benefits and community benefits. The likelihood of receiving philanthropic support improves when the project meets the needs of a local community and aligns with a private partner's mission [29]. A VS may also attract the attention of businesses players oriented towards social responsibility goals or those looking at "sustainable investing", seeking to couple the performance of the business with positive returns and long-term impact on society and the environment. This is further discussed in Section 11.



5 Strategic planning and assessment

Strategic analysis is an extremely important activity in the definition of an innovative project, being a process by which the objectives of a territorial system (the city, the neighborhood, or the local community) are set and the means, tools, and actions to achieve them are identified in a given period.

There are several tools applicable to strategic analysis; among those, the PESTLE (Political, Economic, Social, Technological, Legal, Environmental) and SWOT (Strengths, Weaknesses, Opportunities, Threats) analyses offer interesting elements to highlight the potentialities and criticalities of a specific context or project and represent useful support for the definition of intervention strategy. The impact mapping is mostly used to align different working teams around the overall goal, making assumptions explicit and defining key points of the process. In the following paragraphs, the PESTLE and SWOT analyses and the impact mapping approach are briefly presented, while the activities and the outcomes related to the strategic planning and assessment within the VARCITIES project are described in detail in D3.3 “Report on local barriers and drivers to the implementation of visionary solutions in pilots”.

5.1. PESTLE analysis

A project’s success is influenced by factors operating in its internal and external environment. The project promoter(s) can increase the success rate by adopting strategies that take into account (and even manipulate) these factors to its advantage. The key to success lies not only in understanding existing factors but also in forecasting change so that it can take advantage of change within the environments in which the project is delivered and operates.

The promoter(s) needs to execute this before beginning the project development process. PEST analysis is used to identify the external forces affecting an organization or a specific project/action. This is a simple analysis of the Political, Economic, Social, and Technological elements. A PEST analysis incorporating also legal and environmental factors is called a PESTLE analysis, where:

- P stands for POLITICAL factors;
- E stands for ECONOMIC factors;
- S stands for SOCIAL factors;
- T stands for TECHNOLOGICAL factors;
- L stands for LEGAL factors, and
- E stands for ENVIRONMENTAL factors.

The PESTLE analysis provides you with a structure allowing you to investigate the context in which your organization operates, it prompts you to ask yourself what the external factors of greatest impact on the organization are and to discuss their likely implications:

- What are the key political factors?
- What are the important economic factors?



- What are the most important social and cultural aspects?
- What technological innovations could occur?
- What current and upcoming legislation could affect the sector?
- What are the environmental considerations we should bear in mind?

How you categorize each issue raised is not important when using the PESTLE technique because the purpose of this tool is simply to identify as many factors as possible.

For example, it is not important to classify an upcoming government regulation as a political or legal issue. The only thing that matters, in the end, is that it is identified as potentially having an impact on your organization.

The PESTLE tool is a powerful technique for analyzing your environment, but it should only represent one component of a comprehensive strategic analysis process. PESTLE analysis describes a framework of external macro-environmental factors that combine external micro-environmental factors and internal drivers, which can be classified as opportunities and threats in a SWOT analysis.

Tips for VARCITIES partners

The key elements needed to execute the PESTLE analysis should come from the co-design process, and in particular from the 1st stakeholders' workshop. Specific supporting materials have been prepared in the framework of WP4 activities.

The approach and results from strategic planning and assessment within the VARCITIES project are described in detail in the D3.3 "Report on local barriers and drivers to the implementation of visionary solutions in pilots".

5.2. SWOT analysis

SWOT analysis is one of the most widespread methodologies currently used for the strategic evaluation of projects. This is a logical procedure, borrowed from business economics, which makes it possible to streamline the information collected in a systematic and usable way through specific topics. Through the SWOT analysis it is possible to enucleate the endogenous and exogenous factors:

- The endogenous factors are Strengths and Weaknesses. These are the variables that are an integral part of the system itself, on which it is possible to intervene towards the achievement of pre-established objectives. By working on these variables it is possible to stress those that can favor the pursuit of certain objectives and to try to remove others that hinder or delay the process.
- The exogenous factors are Opportunities and Threats (risks). These are variables external to the local system which, however, can affect both positively and



negatively. Negative external factors cannot be avoided or removed but should be considered and mitigated.

In the corporate sector, the internal factors include, for example, the organizational structure, the degree of technological advancement, the cooperation culture among departments, or the network of partners. Among the external factors, there are the overall technological level in the sector, the opposition of other parties, the lack of resources.

In urban projects recurrent elements in the four areas are:

- Strengths: natural (e.g. natural habitats, floristic and faunal species of high value having a good state of conservation, unpolluted water sources), anthropic (sites of historical and architectural interest), socio-economic (e.g. local sustainable economic activities, strong relational networks among local stakeholders productive sectors of excellence, cultural identity of local populations, sense of belonging to the territory), planning system (e.g. plans already in force that are coherent with the project, development guidelines, etc.);
- Weaknesses: natural (e.g. hydrogeological instability and natural hazards, degraded valuable habitats, polluted sites), anthropic (e.g. degraded or abandoned areas, disconnected and chaotic urban fabric, unauthorized building), socio-economic (e.g. unsustainable economic activities impacting the environment, shrinking and abandonment of traditional activities, poor or inadequate social context), planning system (dated planning tool that does not meet current needs);
- Opportunities: e.g. regional/national / community funding, already planned investments coherent with the project, subsidies to the development of smart technologies, NBSs or renewable energy sources, local committee striving for the recovery of abandoned spaces, presence of local associations aimed at local participation and cohesion, the political will that expressly declares its interest to the project, local social enterprises or start-up, a context of economic growth;
- Threats: e.g. presence of well-known conflicting situations in the urban development strategies, already planned investments in competition with the project, presence of conflicting projects or project ideas, lack of planning culture by the administrators, lack of participation in planning activities.

Tips for VARCITIES partners

Relevant elements to be included in the SWOT analysis should come from the co-design process, and in particular from the 1st stakeholders' workshop, as a better understanding of barriers and drivers. Specific supporting materials have been prepared in the framework of WP4 activities.

The approach and results from strategic planning and assessment within the VARCITIES project are described in detail in the D3.3 "Report on local barriers and drivers to the implementation of visionary solutions in pilots".



5.3. Impact mapping

Starting from original objectives and outcomes, an impact map should be developed taking into account the different perspectives and implications. This strategic planning technique supports the promoter of the VS to clearly communicate assumptions of the product or service to be developed dynamically discussing them with stakeholders and the wider community [30].

A fast and collaborative way to perform impact mapping is in a visual way. It makes it easy to engage stakeholders with different backgrounds and coming from various roles. Visualizing impacts helps also in clarifying hidden assumptions and in documenting key points or even decisions (or at least alignment around the overall goal), avoiding entering into complicated syntax or bureaucracy of the process.

The impact map is similar to a mind map (see Figure 8), and should be created during the group discussion by structuring the process as a sequence of questions:

- The starting point, the first question to be answered is “Why?”. What is the goal you aim to by implementing the VS? Why are you developing this product or service? Avoiding a vague definition is a must.
- The following question concerns the actors and is “Who?”. Who are the different actors related to the VS, basically distinguishing among primary players/beneficiaries (those having a need or wish the VS is going to satisfy), secondary players/suppliers, contractors, partners (those providing some resources/technologies/services needed to implement the VS), players “behind the scene”/stakeholders having some interests or involvement, but still not yet clear (and therefore not included in previous categories)? Who can support or hinder this effort? Who is the target user? Who is impacted? The realm of actors should have consistent overlap with the stakeholder mapping.
- Then comes the question “How?”. It provides the link between the objective and the actor, by specifying how you would like to change the behavior or habits of the actor (e.g. a player starts doing something, ends doing something, or changes the habitual manner). How would the players' behavior change to help us meet the VS goal?
- Finally, the map ends by answering the question “What?”. While changes refer to how people are expected to behave in the future, these points tackle the functionalities (e.g. assets, services, products) to be delivered by the VS to achieve the goal (the player will do this having that available).

This exercise of linking the objectives to players, changes, and functionalities is an ideal way to understand which functionalities may be further refined or prioritized according to the achievement of the defined goal, but they are not the purpose of the VS. They are a tool, or



even better items of a toolkit to achieve a specific goal. Indeed, if a functionality works fine without delivering any change it should be considered a failure.

An example: city goal is to reduce traffic pollution in a district by 20% in two years. The main players identified are workers and people going shopping. A change in mobility behavior is needed, thus a brand-new charging station for e-bikes and a mobile phone app for local online shopping are developed, respectively to attract workers to commute in a sustainable way and consumers in purchasing clothes from home. But in the end, although fully operating, neither the charging station and the app have active users, because actors still prefer combustion engine cars to commute or going shopping to the mall. This should be assessed as a failure, despite the functionalities that have been put in place.

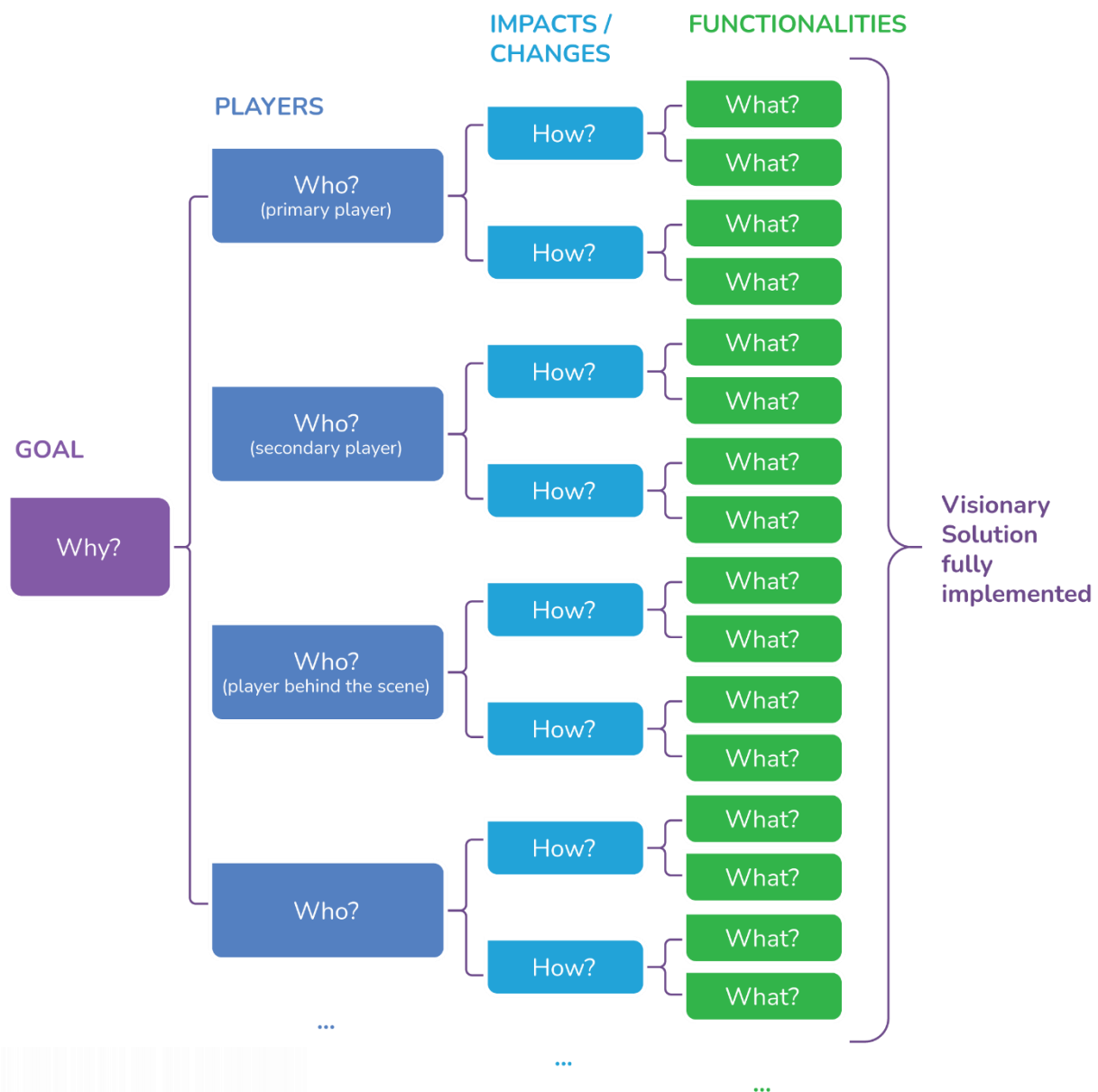


Figure 8: Impact map structure

Tips for VARCITIES partners

This activity of “impact mapping” is probably not needed for VARCITIES demo cities, as they already elaborated the set of VSs and they are not going to be deeply changed from the initial concept.

Eventually, in describing the functionality, you may refer to Grant Agreement for checking the starting TRL of your VS and the degree of maturity which the VS is supposed to reach by the end of its implementation.

5.4. Risk and mitigation measures

By referring to PESTLE and SWOT analysis results, it will be possible to perform a risk assessment of the VS (e.g. risks from legislative changes, regulatory issues, upcoming elections, financing risks, demand risks, approval risks, unavailability of necessary expertise, etc.)

By linking their likelihood to occur and potential impact on the project, the critical risks that can deeply affect the Visionary Solution implementation should become explicit (high and extreme, resulting in unacceptable for the project) (see Figure 9) and thus corresponding mitigation measures should be defined, ensure meeting the main objectives.

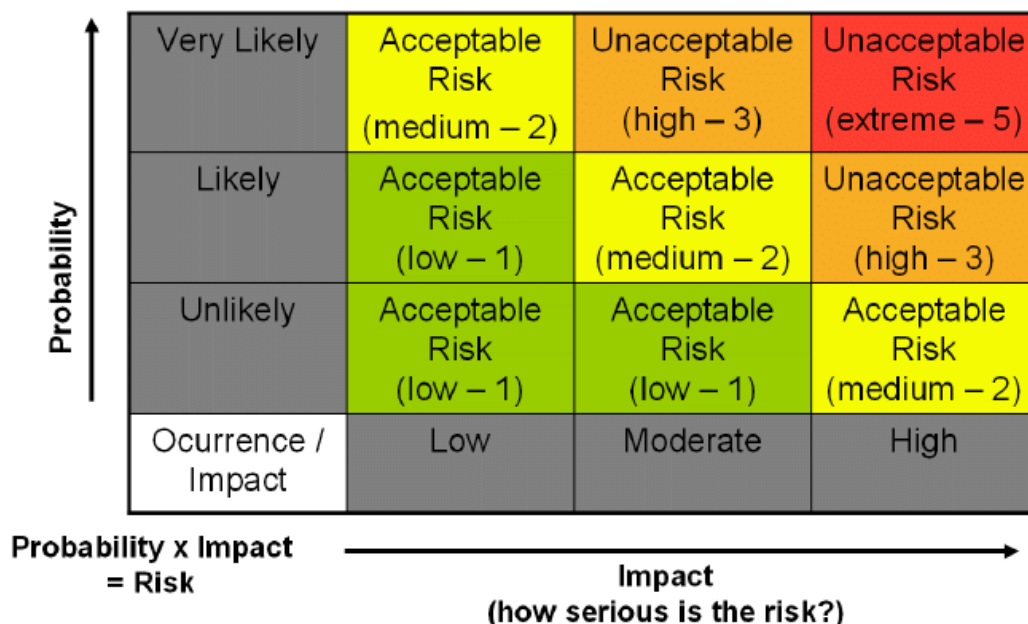


Figure 9: Risk assessment matrix



6 Design of the VS business model canvas

The VS business model canvas is another easy-to-use tool to help the promoter(s) see rapidly the business model of the proposed VS. Originally it consists of 3 major elements (which here should be adapted from the “business” arena to the welfare creation context [31]):

- Value proposition (what product or service the customer wants?);
- Value creation and delivery (who is needed to create and deliver the value proposition?);
- Value capture (how much will it cost to deliver the value proposition and how to pay for the product or service delivered)?

| | | | | |
|----------------|---------------|-------------------|----------------------|-------------------|
| Key activities | Key resources | Value proposition | Key partners | Key beneficiaries |
| | | | Governance structure | |
| Cost structure | | Channels | Capturing value | |
| | | Cost reduction | | |

Figure 10: Business Model Canvas for VS

In the case of a VS, the value proposition canvas in Figure 10 can be considered as a combination of the one elaborated for NBS [32] and the one addressing smart city projects [33]. The European Commission defines NBSs as “solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes, and seascapes, through locally adapted, resource-efficient and systemic interventions” [34]. While a smart city is defined as “a place where traditional networks and services are made more efficient with the use of digital and telecommunication technologies for the benefit of its inhabitants and business. It also means a more interactive and responsive city administration, safer public spaces and meeting the needs of an aging population” [35]. Moreover, in the smart city context, there is also a huge opportunity to collect live data and real-time information,



alongside traditional elaborate research, which reveals new opportunities for urban design implementations.

The value proposition remains at the center of the canvas but is expanded to consider the H&WB benefits for citizens, complemented by the broader environmental, social, and economic value propositions, with an eye on how putting a digital overlay on any physical asset may open the way for unprecedented opportunities and benefits.

What will the VS bring to H&WB, local environment, society, and economy at the demonstration site, neighborhood, or city level? What problem does the VS address and for whom (it must be compelling in solving a real problem)?

It is needed to look beyond the obvious and to try to figure out implications and trade-offs. Is there any concern or adverse side effect related to H&WB of citizens, environment, society, and local economy that we can expect?

The value creation and delivery concerns multiple aspects as key resources, activities, partners, beneficiaries, and governance model. Here below they are briefly introduced:

- Key resources are needed goods, assets (e.g. physical/digital elements, infrastructures, spaces, tools, etc.), and knowledge (technical/legal advice, monitoring protocols, expertise, etc.). Are hybridizations between nature and technology sufficiently exploited (i.e., by using IoT)?;
- Key activities are needed actions or services (e.g. building the infrastructure, implementing the monitoring protocol, acquisition of needed space, etc.). Both key resources and key activities may be acquired externally or outsourced;
- Key partners are the players needed to get hold of key resources or provide activities (e.g. the owner of the land, each department of the public authority responsible for issues recognized by the value proposition, the innovation agency, a trustworthy local association, a consulting firm, a software developer, a technology provider, etc.). Local community partners play a pivotal role to raise awareness and build consensus. How will internal resource or knowledge gaps be filled?;
- Key beneficiaries are the target groups or end-users, including direct (e.g. local residents experiencing benefits, a specific group or category of people, visitors, subscribers, etc.) and indirect beneficiaries (the local government because of positive changes in local taxation or another public department because of reduced expenditures). What are the group of users with homogeneous needs and with a common approach toward the problem being solved? Does the value proposition match their needs and expectations?;
- The governance model is the structure needed to deliver and manage the VS, and it assumes various forms according to the interrelated relationships, factors, and other influences upon the involved partners (e.g. direct delivery from the public administration or conventional public procurement, public-private-partnership, social enterprise, private initiative, etc).



The bottom line of the canvas deals with costs needed to deliver and maintain the VS along its lifetime and expected revenues, as well as identifying potential ways to deliver the value proposition:

- The cost structure is the block when to consider the most relevant costs to the VS create hypotheses for these expenses. Both fixed costs, such as design and implementation or land/infrastructure acquisition costs (CAPEX), and variable costs, such as monthly operating costs or programmed maintenance interventions should be considered (OPEX);
- Channels describe how the governance structure communicates with and reaches its key beneficiaries to deliver its value proposition, and keep them engaged in using the VS. Channels are strongly linked with the blocks revenues and cost reduction, because its purpose is twofold: gaining users (willing to pay for a service/asset or mobilizing the critical mass to justify its existence service) or gaining volunteers and supporters (to reduce the implementation or maintenance costs). The role of the “VS ambassador” (see Section 3.4) and activities needed in building local support (see Section 4.3) are strongly linked to this point;
- Costs reduction, as said above, concerns suggestions and possible ways of increasing the viability of the VS, including possible collaborations or partnerships with other initiatives or services;
- Revenues (value capture) deals with the expected income. Who pays? Who receives the revenues? For what value and how does the end-user pay (subscription fee, usage fee, “pay as you go” pricing)? In some cases, generating direct revenues from the VS solution is challenging, because of its nature of a “public good”. The VS should be also able to mobilize sponsors or gaining funding from donors, by showing its relevant contribution towards the achievement of various social or environmental benefits. Therefore it is relevant to consider in the formulation of the value proposition its role towards well-known frameworks, such as the SGDs, and to define adequate KPIs to capture “non-monetary benefits”.

Tips for VARCITIES partners

Once the business model canvas has been drafted, it is useful to revise the previously filled blocks, by considering the revenues the VS is expected to generate, possible KPIs used to assess the contribution to specific targets mentioned by the SDGs or similar frameworks, other partners, or ongoing activities outside the VARCITIES project to team with them, as reported in D3.2 “Common database and knowledge baseline”.

Clearly differentiate the EU contribution from an already available resource, and other resources to be acquired.

Define the adequate governance model considering local peculiarities and attitude to cooperate of local stakeholders following suggestions provided by Section 9 and further



developed in the D4.5 “Overview report on new governance models of sustainable happy cities”.

6.1. Ownership and inventory of available assets

Rarely do urban projects start out of the blue. Usually, they transform, regenerate or improve existing places, buildings, squares, or infrastructure. Taking stock of the public assets already available (maybe under-utilized or neglected) is a good starting point. Are there particular assets that could be recycled or dedicated to a new scope, by introducing some innovation (looking at NBS, technology solutions or the combination of both)? If so, it is necessary to deeply investigate whether or not the owner of the asset is permitted to reuse the asset differently. Once the owner (a public entity or a specific sector of the public administration) has understood what it is permitted to do, the next step is to quantify the relative value of the asset to both the city and the private sector and to include it in the business model of the VS.

For example, the public authority sells (or leases) a public asset no longer needed to a private entity for value and then uses the proceeds to fund future investment. The government might sell an asset it no longer needs or conduct an asset swap. These elements should emerge and be identified through the SWOT analysis (see Section 5).

6.2. Supporting actions and already running initiatives

Any additional type of external support which is required in the preparation or will be needed during the implementation of the VS (e.g. technical expertise, legal advice, procurement preparation, financial structuring, audits, business plans, surveys, crowdfunding/awareness creation campaign, etc.). should be identified within the “key resources” category.

Similar to existing assets, also already running coherent initiatives may help in filling some gaps and defining the context in which the VS takes shape. These could be a good starting point to establish new cooperation and alliances, and reducing implementation costs. Similarly as said in the previous subsection, these elements should clearly emerge and be identified through the SWOT analysis (see Section 5).

6.3. Maintenance

Securing adequate resources for the maintenance of the VS and its prosecution after the project conclusion is a key point to maximize the long-term positive effect and prevent disappointing experiences [36]. Such day-to-day expenses, needed to ensure the VS operational, are defined as CAPEX. In cases of high-tech interventions in the urban fabric, maintenance should also include costs and know-how for software, hardware, and



equipment upgrade, considering that systems that are designed now can become obsolete quite rapidly after the implementation.

Tips for VARCITIES partners

Try to figure out how the VS will be maintained and managed after the end of the VARCITIES project. Is it possible to include it into any broader urban plan, project, or strategy?

6.4. Scale-up and replication

The financial figure of the VS could be not enough attractive to motivate the investment under a strict Cost-Benefit Analysis. Nevertheless, the forward-looking ambitions of such a solution will probably deliver much more benefits or leading to cost reduction considering potential scale-up nearby the same demonstration site or its replication in other sites of the same urban system.



7 Funding and financing opportunities, going towards the business-model

Nature-Based Solutions (NBS) cover approaches and interventions across a wide spectrum of practical measures and aim to offer technological, societal, and organizational level improvements. The benefits of using NBS to address issues arising from climate change and related H&WB are becoming increasingly clear, with many countries across the world including NBS in their mitigation plans. In 2020 worldwide investment in NBS amounted to \$133 billion with public funding representing 86% of that whereas private only 14% [37]. In Europe, the value of 168 NBS across cities is valued at \$1.6 billion [38]. It is interesting to note that NBS finance is at a significantly lower level compared to funding going into climate solutions.

In the context of VARCITIES Visionary Solutions (VS), funding of NBS requires a clear understanding of the value such interventions bring at local and regional levels, and the type of revenues and/or return on investment. For example, pure smart city projects can generate consistent revenues, whereas NBS or social infrastructure projects provide assets and services in exchange for a revenue stream that is mostly paid directly by the public sector. Only in some cases may external cash flows contribute to the revenue stream needed to repay the initial investment [39].

Often, the local authority pays to build and operate the service, receiving funding from the central government or a direct return in the form of savings or indirect benefits. But the local authority could also recoup its investment by getting the public to pay fees (directly or indirectly) to use the service.

In an alternative scenario, revenues to support a VS could come from selling value generated to other third parties. The project developer might, for example, sell advertising space on an asset, monetize data that the service collects or form affiliate or strategic partnerships, and use these revenues to pay for the asset or the service for the city/public.

Creative ways to combine private and non-profit sector participation is a good way for cities to overcome their funding and financing barriers, also profiting from lessons learned from other cities facing similar challenges [40]. Complex projects, such as smart cities, Nature-based Solutions, or even more visionary solutions often call for multiple investors, because of their multiple purposes. Understanding the visionary solution's fundamental components, and being able to communicate them, as recalled in Section 3.1, is fundamental to attracting appropriate partners and sources of capital.

It is important to develop a strategic approach, by ensuring that public or private funding sources can be aligned with the NBS needs, to secure financing and support for different aspects of the visionary solution. This approach must consider possible barriers that can inhibit the development of a strong pipeline of NBS funding and investment solutions [41], such as:



- Lack of awareness and understanding of NBS (mainly technical barriers and knowledge gaps) prevents the adoption and upscaling of NBS and are also connected to challenges around financing.
- Lack of coordination by the various stakeholders, especially at the public sector level, in terms of expertise, policymakers, and local communities.
- Lack of clear information to track NBS initiatives, e.g. in some cases NBS are included under climate change mitigation but not explicitly differentiated. This can prevent funding and investment sources from identifying and aligning with NBS needs.
- No clear performance metrics exist to measure the performance of NBS and track their value (difficulties in articulating the co-benefits and also in monitoring).

To overcome these barriers, it is needed having a clear picture of available (local public) money to be used to cover the CAPEX (e.g. major expenditures foreseen over the long term for the implementation of the VS), as well as additional grants or funding (usually free of charge or interest-free) and financing options (someone provides an amount of capital with the expectation that it will be repaid with interest). In the case of VS generating at least some financial returns, together to achieve positive, measurable social and environmental outcomes, the issue of financing options may be investigated following an “impact investment approach”. This means that the investments are made with the intention to generate social and environmental impact alongside a financial return [42]. Given the diversity of the social and environmental challenges that impact investing is attempting to tackle, it is therefore not surprising that the latter has grown in multiple directions, taking on different shapes depending on the specific objectives and challenges faced. In particular, most of the variations that social finance tools may assume can be efficiently represented along the axes of the degree of focus on impact and on financial returns (see Figure 11). The result is the impact investment spectrum specified on a linear continuum that goes from a focus on financial returns only to a focus on impact only [43].



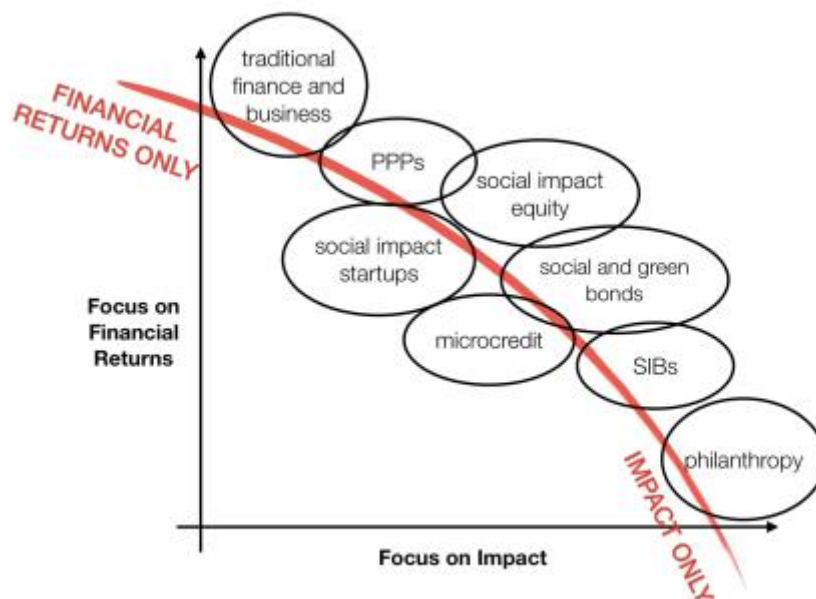


Figure 11: Impact investing spectrum. Source: [43].

Some current opportunities are briefly discussed in the next few sections. Additional suggestions to cities on how to finance actions and projects may be found looking at:

- “Six effective ways for cities to invest in climate action” provided by C40 [44]
- Recent experiences of European projects on Innovative Business Models for Nature-Based Solutions [45].

7.1. Public funding Initiatives

As the majority of VS are deployed at Municipal/public land and involving public infrastructure, cities have access to a combination of funding mechanisms that deploy public funds which can be used for VS projects as a crossroad of green and digital transformations:

- Regional budgets earmarked for solutions delivering positive societal impact have been used for green infrastructure projects. However, in some cases these can be insufficient requiring a more global approach where funding can be pooled from different city departments to deliver projects with cross-sectoral benefits [46];
- Grant funding, in which local authorities can access grants from the European Union such as:
 - Horizon Europe [47],
 - Programme for the Environment and Climate Action (LIFE) [48],
 - European Regional Development Fund (ERDF) [49],
 - Cohesion Fund [50];
- Philanthropic contributions have provided projects with charitable contributions from foundations, citizens, private sector donors, etc.;

- Crowdfunding can also raise funds for a public interest project through the donation of small amounts from a large number of individuals. It can also support smaller-scale projects that in some cases are not suitable for other financing sources. In crowdfunding, the use of Blockchain may facilitate greater uptake of the funding initiative since it provides a secure and transparent manner to manage financial contributions [51].

The EU and the Commission provide support to cities through a wide range of funding programs, covering funding opportunities as well as providing advice on how to access funding [52] and technical assistance on NBS development [53].

Tips for VARCITIES partners

The VARCITIES project itself takes shape within the Crowdhelix Open innovation platform [54], and the project partners have access to it, to continue further cooperation.

7.2. Revenue-based mechanisms

Additional funding mechanisms may arise from revenue-based VS that seek to develop a value for the stakeholders [46], such as:

- Land sales or leasing, which can provide upfront capital in the case of state-owned land. This can be used in conjunction with other mechanisms, such as trust. The latter can be established early on in the project to use accrued interest to pay for the maintenance of the NBS infrastructure.
- Taxation imposed by the local authorities and used for the recovery of capital expenditure of VS.
- Fee-based, whereby the use of space, sports facilities, car parks etc are under a nominal fee. In addition, advertising can provide further income.
- Data monetization, in VS incorporating new sensing modalities which track footfall (which can be linked to advertising), traffic as well as environmental conditions, that can be potentially sold to third parties.
- Developer charges, that are typically one-off charges paid by developers in return for receiving development approval.
- Offsetting/compensation fees in a case where development may be detrimental to other environmental or common goods. Such payments can then be used to finance future projects.
- Betterment fees, one-off or recurrent paid by landowners of an area.



7.3. Partnerships

Increasing uptake of innovative NBS coupled with ongoing pressure on public finances necessitates collaboration between public and private organizations [55]. The latter can be key partners in enabling NBS infrastructure by bringing market insight, management experience and technological solutions that can complement the public sector's policy making. In some cases, the partnership can be managed via a joint venture, called Special Purpose Vehicle (SPV) which can conduct the construction and operation of the project [56]. A well-implemented partnership can bring together the expertise of both public and private organizations and is a well-placed mechanism for larger VS projects.

7.4. Debt-based mechanisms

Financing mechanisms based on debt, also known as Green Finance, can enable VS projects where public funding is not available or adequate [57]:

- Debt financing/loans, in which cities can apply for loans from public or private financial institutions. The former can offer low-interest loans where a project can deliver tangible benefits;
- Green Bonds are a loan-like instrument to raise capital and typically commits the issuer to use the bond proceeds exclusively for projects that can demonstrate environmental benefits. The city can borrow capital, which can be used to initiate a project, from investors (private or institutional and financial organizations) [58];
- Natural Capital Financing Facility (NCFF) is a facility set up by the European Commission and the European Investment Bank to support nature-focussed projects including projects mitigating or adapting to climate change [59].



8 Procurement structure

As discussed above, Nature-Based Solutions are a powerful tool for cities to combat the effects of climate change and deliver impactful societal change to their citizens. However, they also pose challenges in funding, as highlighted in Section 7 and delivering to the local authorities. One such challenge appears in the form of procurement and reflects complexities within the wider procurement system public authorities operate within.

Like issues related to funding, the greatest challenge for NBS procurement comes from the usual lack of an understanding of NBS compared with Green Public Procurement (GPP) and Sustainable Public Procurement (SPP). The former describes the process of procuring goods, services, and works that exhibit a reduced environmental impact through their life cycles [60]. Whereas the latter incorporates the same elements as GPP but also includes a social dimension of public purchases.

NBS procurement refers to products or services that can be procured in contrast to GPP and SPP that are interested in the environmental and social impact of public purchases. GPP and SPP can enable the successful deployment of NBS. However, the confusion around the key principles of the three practices can be detrimental to NBS deployment, especially as public procurers lack experience around NBS [61].

The key to overcoming this obstacle is to educate the procurement system of the true scope of NBS and ensure that it is properly categorized and included in the practices of public procurement [62].

8.1. Public Procurement

The public sector defines its requirement for goods and/or services, procures them via traditional procurement and contracting methods, and pays for them.

As public procurement accounts for a substantial portion of the taxpayers' money (approximately 12% of GDP and 29% of government expenditure in OECD member countries), governments are expected to carry it out efficiently and with high standards of conduct to ensure high quality of service delivery and safeguard the public interest [63].

The public procurement process must follow the local regulation (even withing EU co-funded project the national law prevails on EU rules) and usually the beneficiary must make such purchases ensuring the best value for money or, if appropriate, the lowest price (avoiding any conflict of interests).

The public procurement usually starts with the publishing of a public tender by the Contracting Authority (CA) and the process can then be as follows [64]:

- Open: This is a process where all providers interested in the contract and who have responded to an advertisement can submit tenders. All such tenders must be considered without any prior selection process. The selection and evaluation are carried out after the submission of the tenders.



- **Restricted:** This is a two-stage process where only those providers who have been invited may submit tenders. The selection and shortlisting are usually carried out based on a Pre-Qualification Questionnaire (PQQ). The Directive sets a minimum of five candidates. The CA may impose a limit on the maximum number for a given procedure.
- **Exceptionally Negotiated/Competitive Dialogue:** This is where the CA may, in certain exceptional circumstances, negotiate the terms of a contract with one or more suppliers of its choice. Ordinarily, negotiation/dialogue should be with not less than three candidates provided that there is a sufficient number of candidates available. The candidates with whom to hold a competitive dialogue may be selected through a restricted procedure.

Complex activities usually call for the creation of a joint tender, where a tender is submitted by a group (with or without legal form) of economic operators regardless of the link they have between them. The group as a whole is considered a tenderer.

Additional info on EU public procurement policies is available at: https://ec.europa.eu/growth/single-market/public-procurement_en.

8.2. Public-Private Partnership (PPP)

Public-Private Partnership (PPP) projects harness both the public and the private sector to provide goods and services which are conventionally supplied by the public sector while easing the stringent budgetary constraints placed on public expenditure. They are not different from traditionally procured projects, apart from the principle of risk-sharing between public and private partners. The latter's risks tend to be related to the design, financing, operation, and maintenance, while the former takes on regulatory and political risks.

Such initiatives can enable public authorities to procure large-scale infrastructure projects through a single procedure. However, the procurement process requires a different degree of negotiation which takes longer than the public procurement process. In a recent audit, a third of 12 audited projects experienced significant delays [65].

Due to the large scope and duration of the PPP project, its procurement process requires particular diligence to ensure that funds are spent effectively. However, PPP does offer opportunities for additional funding which combined with the risk-sharing may make procurement via a PPP mechanism attractive.

8.3. Direct Delivery

Another option for the provision of a new service is a direct delivery from the public authority, although this is usually restricted to some specific steps.



For example, the responsible public sector provides directly the design needed to implement the visionary solution, utilizing internal resources (mainly staff and assets). This is quite rare because it implies dedicated skills of civil servants (e.g. knowledge of advanced technologies) and capabilities of reusing and modifying existing assets (e.g. converting traditional public space into a nature-oriented green area).

Once the design phase has been accomplished by the internal staff, it will be needed to tender the procurement of the necessary components to implement the VS. Then the installation and practical execution of the work can be either tendered to a construction company or directly executed by the internal staff.



9 Governance structure

The shift towards Nature-Based Solutions and the use of new urban-scale technological solutions challenge cities to rethink their governance structures and practices. There is an increasing interest in promoting inclusive co-design processes in planning and designing visionary solutions. This is easier said than done. It requires new ways of thinking, working, and collaborating, and for those working on implementing solutions, there is a need to understand and address the new governance and planning challenges the shift creates. Writing about the governance of new blue-green infrastructure in cities argues that the current challenges require a set of holistic and flexible governance approaches, which include, for example, new forms of cross-sectorial collaboration and citizen engagement. Importantly, the implementation of Visionary Solutions requires that cities use more than technical know-how, and mobilize competencies from across institutional barriers [66].

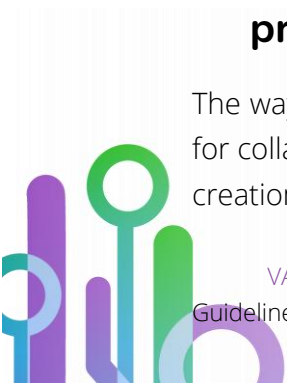
9.1. The problem of institutional “silos”

One problem that has to be overcome is the presence of institutional “silos” [67]. This is a well-known problem in organizational studies. It is the phenomenon where the division of tasks and responsibilities within institutional structures, for example, a municipality, is divided between different departments – for example, the Department of Water, Department of Environmental Protection, etc. This division is often rational and effective because institutions need to divide tasks and have clear lines of who is responsible for solving particular problems. But this can also create challenges for the type of problems addressed in VARCITIES – nature-based solutions and innovative technological designs – because these problems cut across the traditional divisions.

Studies show that institutional structures can become “silos” – meaning that they develop their institutional logic and norms, expectations, and problem definitions [68], [69]. Departments gather people with specific competencies and educational backgrounds. For example, water departments may have mostly engineers, while planning departments may have employees with social science backgrounds. This means that, when they are trying to collaborate on a shared problem, they understand the problem differently and propose different types of solutions. It may be difficult to generate holistic solutions when each of the actors only manages to see the problem from their own perspective.

9.2. Breaching the “silos” through co-creation and co-production

The way to overcome silos in problem-solving is typically to create platforms and dialogues for collaboration across institutional boundaries. Different terms are used to describe it: co-creation and co-production are common approaches. Co-production can be understood as



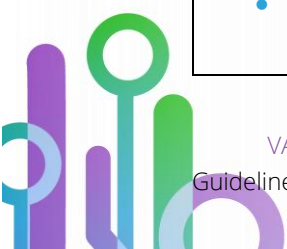
a deliberate collaboration between actors to achieve a common goal [70]. Researchers have used several different theoretical frameworks to analyze cooperative arrangements between and within local and regional authorities, focusing on network-building and institutional collective action. Within the field of organizational studies, policy silos have been addressed through what is termed cross-functional cooperation [71], [72]. The idea is to solve cross-cutting problems, like the implementation of VSs, by putting together teams of people from across different functions, competencies, and backgrounds into the same processes. This is of course easier said than done. There can be disagreements over who has the responsibility to fix the problem or to implement the solution, and disagreements over what the problem is in the first place.

A useful approach is to address the problem in as practical terms as possible. Instead of creating theoretical models of the relationships between abstract factors, it can be useful to focus on practitioners' experiences and interpretations of challenges. For instance, within VARCITIES, the Pilot City of Bergen has organized "collaborative hackathons" (or "Klimathon") for the co-production of effective climate adaptation. At the Klimathon events, interdisciplinary and intersectoral groups collaborated intensively over two days, discussing and designing practical and strategic solutions to the challenges of planning and implementing climate adaptation at the local level [73]. Each group was composed of representatives of different institutions (municipal, county council, politicians, researchers) at different governance levels (local, regional, national).

The key lesson for the implementation of VARCITIES VSs is on how the discussion of practical and concrete problems makes it easier to debate across differences in competencies, backgrounds, and institutional attachments. The events provided a specific arena for understanding others' daily realities through collaboration and dialogue across research environments, practices of policymaking, and levels of public administration. They also revealed a series of bottlenecks in climate adaptations, which are likely relevant for the implementation of VSs (e.g. that implementation often lacked adequate political support and that implementation was hampered by unclear institutional responsibilities). A way to overcome these bottlenecks can be to include politicians early on in the processes, to align the implementation of VSs clearly to political priorities, and to put together cross-sectorial teams that are charged with problem definitions, process design and implementation planning.

Tips for VARCITIES partners

- Consider the different competencies of people involved in implementing the different VSs: do you have a broad range of competencies represented? Are any important competence areas lacking? How can they be added?
- Put together cross-institutional and cross-functional teams to oversee implementation. Make sure to do this early in the process.



- Mapping which institutions or municipal departments have responsibilities for different aspects of the process. If you are dependent on getting the agreement from one department (for example the Department for Public Transportation), make sure you bring them on board early in the process to avoid conflicts later.

Make sure the different institutional representatives and agencies have a common understanding of the problem. It is not necessary to agree on all aspects but try to identify differences in understanding early on so you are aware of them.



10 Evaluation frameworks

Implementing VS means to some extent changing places or the functions they provide to the community, and thus creating (or even destroying) value for some groups of people.

In many projects, and even more in the case of VS aiming to improve the H&WB of citizens, cultural aspects may have to be considered and prioritized to understand what “value” means”, considering dissonant heritages, minorities, vulnerable age groups, etc. This implies that the value created goes far beyond what can be captured in financial terms. Unlikely, in such cases, the financial value (usually easily measured and accounted for) is less relevant compared to other benefits of greater significance and importance. Therefore, it is important to take decisions concerning VS based on well-argued and competed for information about full impacts and to choose an adequate evaluation framework [74].

In a time of scarce public funds, raising the culture of accountability of investments, transparency in reporting both to taxpayers or investors, local authorities and private partners are demanding “Value for Money” (VfM) of interventions. This will ensure both economic and social efficiency and better allocation of resources for welfare increasing of the local community.

Traditionally, to assess the viability of investments, frameworks such as Cost-Effectiveness Analysis (CEA), Cost-Utility Analysis (CUA) and Cost-Benefit Analysis (CBA) have been used. However, in recent times, Social Return on Investment (SROI) methodology has been promoted as a more ‘holistic approach to demonstrating VfM [75]. The following **Errore. L'origine riferimento non è stata trovata.**¹ compares these approaches.

Table 1: Comparison of economic evaluation frameworks

| Cost-Benefit Analysis (CBA) | Cost-Effectiveness Analysis (CEA) | Social Return on Investment (SROI) |
|---|---|---|
| Main objective | | |
| To assess if an intervention is worth the investment. | To compare costs and impact of alternatives within the same domain. | To assess if an intervention is worth the investment. |
| Costs | | |
| Monetary value | Monetary value | Monetary value |
| Benefits | | |
| Captures health and non-health impacts. | Benefits linked to health improvements. | Captures health and non-health impacts, underpinned by the “triple bottom line” approach (social, economic, and environmental). In addition, seeks to account for and value potential negative outcomes of interventions. |
| Reported as the monetary value or welfare benefit. | Reported as natural units. | Reported as the monetary value or welfare benefit. |

| | | |
|--|---|---|
| Lists benefits that cannot be easily monetized and explain why they cannot be monetized. | | Uses financial proxies to estimate the monetary value of outcomes that cannot be easily monetized. |
| Uses financial proxies to estimate the monetary value of benefits that cannot be easily monetized. | | |
| Level of application | | |
| Project, program | Project, policy | Project, program, policy, or organization level |
| Timeline of analysis | | |
| Ex-ante / Ex-post | Ex-ante / Ex-post | Ex-ante / Ex-post |
| Discounting of future value | | |
| Yes | Yes | Yes |
| Stakeholder engagement | | |
| No | No | Yes |
| Theory of Change | | |
| No | No | Yes |
| The main output of the analysis | | |
| Benefit-Cost Ratio (B/C) Internal Rate of Return (IRR) Net Present Value (NPV) Payback period (PBP) | Incremental Cost-Effectiveness Ratio (ICER) | Social Return on Investment Ratio (C:B) Net Present Value (NPV) Payback period (PBP) |
| Interpretation of main output of the analysis | | |
| B/C ratio > 1 is a worthwhile investment | Intervention with higher ICER is better | SROI ratio > 1 is a worthwhile investment |
| Relevance | | |
| Priority setting and resource allocation. | Priority setting and resource allocation. | Priority setting Resource allocation Stakeholder relationship building Accountability framework Management tool |

Independently from the approach, the crucial question concerns what are the framing conditions and boundaries of the assessment, mainly referring to:

- whose benefits and costs count, and how long will the benefit last?
- what is the expected life of the VS to be considered in the evaluation framework (what is time before technology replacement or outdate)?

Some guidance to the latter question is offered for example by the European Commission (EC) Regulation, see Table 2.

Table 2: EC's reference periods by the infrastructure sector

| Infrastructure Sector | Reference Period (Years) |
|-----------------------|--------------------------|
| Railways | 30 |
| Roads | 25-30 |

| | |
|-------------------------|-------|
| Ports and airports | 25 |
| Urban transportation | 25-30 |
| Water supply/sanitation | 30 |
| Waste management | 25-30 |
| Energy | 15-25 |
| Broadband | 15-20 |
| Research and innovation | 15-25 |
| Business infrastructure | 10-15 |
| Other sectors | 10-15 |

10.1. Cost-Benefits analysis

Cost-Benefits Analysis (CBA) is an analytical tool that allows to assess the variation in social welfare resulting from an investment decision (usually related to land or infrastructure development) and, consequently, the latter's contribution to achieving the objectives of an overarching policy.

The assumption on which CBA is based is to allocate resources for a project until the marginal social benefit equals the marginal social cost. In other words, a project or policy can be considered valid from a societal point of view if the benefits generated exceed the costs.

The purpose of CBA is therefore to facilitate a more efficient allocation of resources, by demonstrating the convenience for the society of a particular intervention compared to other possible ones.

The evaluation can be ex-ante (it tries to forecast costs and benefits), to evaluate if it is appropriate to implement the policy or the project, and in turn to assess whether that specific destination of the investment is preferable over alternative solutions. The outcome may lead to the decision to select a different design option, or not to implement the project, thus remaining in the status quo (i.e. current situation).

The CBA can also be done ex-post (retrospective to the intervention). In this case, it is assessed whether the selected project design has been beneficial for the society. The purpose may be to deeply investigate the decision-making processes that led to that choice, and, if the ex-post CBA returns a negative result, to define possible amendments to them.

The CBA tool allows the decision-maker to determine the monetary value of social welfare in the presence or absence of the project.

Key aspects of CBA are:

- Identification of most relevant alternatives concerning a specific objective. The CBA should consider reasonable alternatives (even though not initially considered by the project developer or decision-making body) to identify the best solution.
- Comparison of alternatives to the status quo or minimal intervention.
- Identification of direct and indirect costs and benefits, within a reasonable reference area (geographical scale, social dimension, environmental system).



- Measurements of the direct costs and benefits associated with a project, that determine the variations in social welfare. The measurement takes place in monetary terms. Usually, the project determines construction costs, maintenance, etc. which can largely be derived from market prices. Similarly, expected revenues from the project are also easily measurable in monetary terms (e.g. tariffs, tolls, entrance fees, etc.).
- Measurements of the indirect costs and benefits associated with a project. It is necessary to identify the "other" costs and benefits positive or negative caused by the project (these are traditionally called externalities, especially referring to environmental detriments, while in a more recent approach the positive effects are mentioned as co-benefits, ancillary benefit or other similar words). Some other "technical" analyses such as the Environmental Impact Assessment (EIA) or the Life Cycle Assessment (LCA) may be used to determine what the "other" impacts generated by the project are. About co-benefits of NBS see Section 11.1.
- Monetization of positive or negative impacts on social welfare. If it is not possible to directly derive a market price for these impacts, the values must be derived from demand (willingness to pay - WTP) or supply (willingness to accept - WTA) curves. These curves are obtained indirectly from "surrogate" markets, with methods for detecting the revealed preferences; or directly, through the use of questionnaires, with methods for detecting declared preferences. Table 3 provides an overview of the various typologies of non-market techniques used in the economic literature to evaluate non-market goods [76]. In particular, revealed-preference methods assess the economic value of a good or service through market data, using the consumer surplus (CS) for that good or service as a measure of welfare change. While in the stated-preferences context, welfare changes are estimated through two different measures: compensating variation (CV) and equivalent variation (EV).
- Time horizon to be considered for the evaluation of the project. This is related to the economic life of the investment. Usually, for transport infrastructures such as roads, bridges, ports, it is generally considered to be a period between 30 and 50 years; see Section 12.
- Discounting of cost and benefits. All relevant costs and benefits arising along the timeline should be calculated on a common temporal footing (usual at present). This is done using time value of money calculations, by converting the future expected streams of costs and benefits into a present value amount with a discount rate. In general, when the interest rate is given (r), the present value of the future expected amount of euros (X) at the end of a certain period of years (T) is simply $\frac{X}{(1+r)^T}$ Euros. The longer the term the loan will be due, the lower the value.
- Therefore, even in the absence of inflation, the value of a euro available in the future is lower than that of a euro available today and must be "discounted" for an amount that depends on the interest rate and the time that must pass before the sum is

due. For this reason, r is often referred to as the discount rate, and $(1 + r)^T$ is referred to as the discount factor.

- Risk and sensitivity analysis. Assigning a monetary magnitude to cost and benefit flows placed ahead in time deals with uncertainty (of their existence as well as the real future value of money). Thus, there will be a certain distribution of probability around that value. The project evaluation must take this risk into account: riskier projects will be *ceteris paribus* (i.e. keeping all other conditions the same) less profitable than less risky projects. A sensitivity analysis should be also performed by varying some assumptions related to cash flow as well as the applied discount rate [77].

Table 3: Non-market evaluation techniques. Source: [78]

| Group | Typology | Technique | Welfare measures |
|------------------|-----------------------------|--|------------------|
| Indirect methods | Revealed preferences | Travel cost | CS |
| | Revealed preferences | Hedonic pricing | CS |
| Direct methods | Stated preferences | Contingent valuation method (CVM) | CV/EV (WTP/WTB) |
| | Stated preferences | Choice experiment (CE) | CV/EV |
| Second best | Stated/revealed preferences | Benefit transfer (BT) Value-function transfer | CS/CV/EV |

The CBA, in any case, evaluates the purely financial convenience of the project, to assess the necessary financial backing, as well as to identify any participation in the backing by the users. Common indicators of financial performance are:

- The Net Present Value (NPV), which is given by the difference between discounted Benefits (B) and Costs (C): $NPV = B - C = B_0 - C_0 + \frac{B_1 - C_1}{1+r} + \frac{B_2 - C_2}{(1+r)^2} + \dots + \frac{B_T - C_T}{(1+r)^T}$.
The NPV is a measure of the project's profitability. If the NPV is positive, this means that the social benefits are higher than the social costs: if the alternative is the status quo with zero costs and benefits, a positive NPV indicates that the project can be implemented. By comparing different options (having the same investment size), the one with a higher NPV is preferred.
- The Internal Rate of Return (IRR), which is the discount rate that would make the current value of the project equal to zero ($NPV = 0$). In other words, the one that allows the value of the initial investment to be recovered at time T. It follows that a project is eligible if it exceeds the opportunity cost of the investment. The reference is usually taken as a non-risky investment (e.g. bank deposit). By comparing different projects, the one with a higher IRR is preferred.
- Discounted Pay Back (DPB) period over years. The payback period is the length of time required to recover the cost of the project, the DPB takes into account the positive discounted cash flow coming from the benefits of the implementation of

the project as well as discounted costs occurring over time. The shorter the PB time, the better the project is.

- Cost-Benefit Ratio (B/C), which is given by the ratio between the sum of the Benefits and the sum of the Costs. For a project to be eligible, this ratio must be greater than one ($B/C > 1$). The relationship between the sum of the Benefits and that of the Costs must preferably be done with the discounted values.

It is possible that a project delivers a positive economic return from the point of view of social well-being, but that from a purely financial point of view it is at a loss, because of poor financial indicators. However, the social benefits generated can make the project worthwhile. The realization of a green area in a district has for sure a negative financial return since the costs of construction and management are not covered by any monetary revenue from users. But the social benefits to the local community are relevant. In that case, alternative assessment frameworks should be considered.

10.2. Cost-Effectiveness analysis

Cost-Effectiveness Analysis (CEA) is a tool for evaluating public projects or policies, particularly applied in the sectors of health, road safety, national defense, or energy efficiency [79]. It identifies the economically most efficient way to achieve a given objective. It is generally preferred to CBA by non-economically trained analysts (e.g. engineers, doctors, etc.), who are less inclined to accept, also due to their technical-scientific background, the controversy of monetizing the benefits of "intangible" goods such as human life, time, health or environmental services, which is required by the CBA. CEA analysis is also applied by economists who did not recognize the underneath social welfare approach of CBA.

In CEA only the direct costs invested in the project are considered, while the effectiveness is measured with a single outcome which stands as the main expected impact of the intervention (see Figure 12) and is used to compare costs and impact of alternatives within the same domain. It does not evaluate the monetary value of the outcomes: they are reported as natural units (e.g. lives saved or cases averted).

Similar to CBA stakeholders are not involved in the process, the main objective of the intervention and its impact is defined by the evaluator. CEA can be applied ex-ante, to steer the decision-making process or as an ex-post evaluation on an intervention already carried out.

In the selection of the alternatives, the intervention with a higher cost-effectiveness ratio is better. If the outcome of a program cannot be defined as a priority outcome, or if homogeneous and quantifiable units cannot be determined, the use of cost-effectiveness analysis should be avoided [80].

The typical indicator of CEA is the incremental cost-effectiveness ratio (ICER), the ratio of change in costs to the change in impacts.



A classic and interesting example of cost-effectiveness analysis are the Marginal Abatement Cost Curves (MACC), used to visualize the abatement cost and abatement potential of CO₂ emissions.

Main steps involved in cost-effectiveness analysis

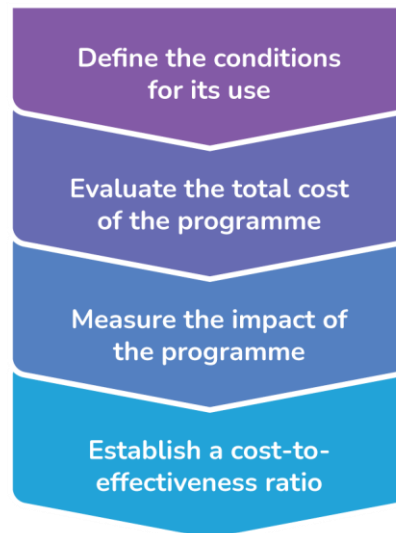


Figure 12: Main steps in CEA (source: based on [80]).

10.3. Social Return on Investment

Social Return on Investment (SROI) is a framework for measuring and accounting for a much broader concept of value; it seeks to reduce inequality and environmental degradation and improve well-being by incorporating social, environmental, and economic costs and benefits [81].

SROI analysis may be conducted as a forecast, which predicts how much social value will be created if the project/program meets its intended outcomes and/or as evaluative, which is conducted retrospectively and based on actual outcomes that have already taken place.

SROI was developed from social accounting and cost-benefit analysis and is based on seven principles (see Figure 13).



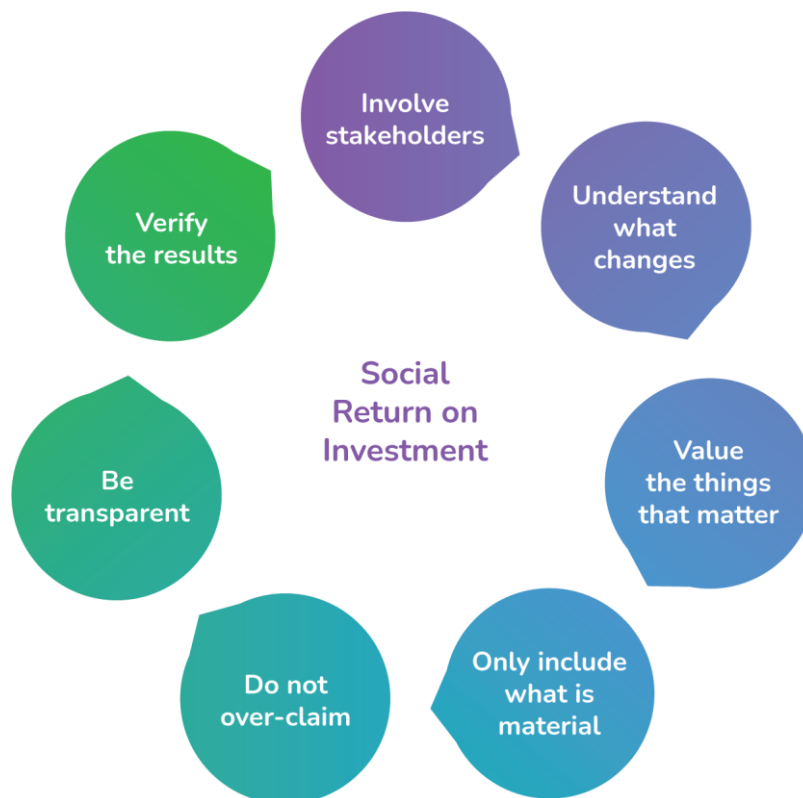


Figure 13: Seven principles of SROI (source: based on [80]).

The principles are:

- Involving stakeholders, to determine which are the outcomes (while outputs are the activities delivered by the intervention).
- Understanding what changes (what are changes experienced by each category of stakeholders).
- Valuing the things that matter (translating into monetary values such changes, also using financial proxies to estimate the monetary value of outcomes that cannot be easily monetized and considering values expressed by different groups of stakeholders. Positive and negative outcomes, as well as those unintended, must be included (see Figure 14).
- Only include what is material (focuses the analysis only on changes that pass a certain relevance and significance threshold).
- Do not over-claim. The SROI should take properly into account concepts such as deadweight (would have happened without the activity?), displacement (what activity would/did the intervention displace?), attribution (what else contributed to the change?) and drop off (does the outcome drop off in future years?).
- Be transparent in reporting on steps undertaken, indicators, valuation approaches, and monetary evaluation results.

- Verifying the result. In the case of ex-ante evaluation, monitoring the correspondence of real outputs and outcomes to the forecast.

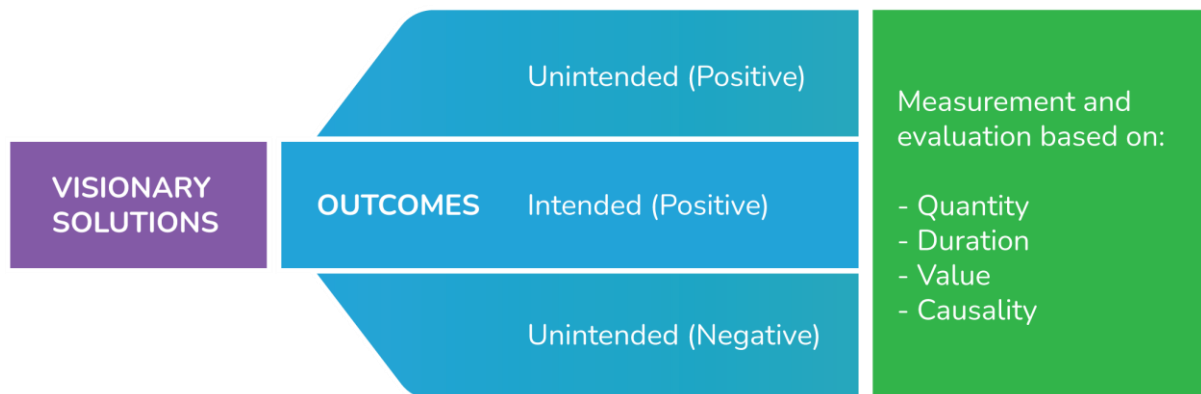


Figure 14: Possible outcomes deriving from implemented project activities

A crucial distinction between a CBA and SROI is that the first takes as main evaluation object the outputs of the VS (e.g. the physical, digital or natural infrastructure provided to the city against its cost), while the latter focuses on welfare changes experienced by the stakeholder in being involved in the project/program and benefitting from its result (e.g. what outcomes the existence of the physical, digital or natural infrastructure or participating to its implementation during the co-design process delivers to a specific group of people, regardless its role in the process). Outputs are very clear in CBA and SROI, while outcomes in SROI should be defined by the analyst interacting with stakeholders. Thus, carrying out an SROI analysis involves six stages (see Figure 15):

- Establishing scope and identifying key stakeholders. It is important to have clear boundaries about what your SROI analysis will cover, who will be involved in the process, and how (Who do we affect on? Who affects us?).
- Mapping outcomes. Develop an impact map while engaging with stakeholders, or a theory of change that shows the relationship between inputs (What stakeholders invest and how much time dedicate?), outputs (activities delivered by the project), and outcomes (changes experienced by the stakeholders).
- Evidencing outcomes and giving them value. This stage involves finding data to show whether outcomes have happened and then valuing them. It explains how the described outcomes are going to be measure (including any sources used) and how they are translated into values (it describes the monetary valuation approach used to express the relative importance/value of each outcome).
- Establishing impacts. Having collected evidence on outcomes and monetized them, those aspects of change that would have happened anyway or are a result of other factors are eliminated from consideration.

- Calculating the SROI. This stage involves adding up all the benefits, subtracting any negative outcomes, and comparing the result to the investment. This is also where the sensitivity of the results can be tested.
- Reporting, using, and embedding. Easily forgotten, this vital last step involves sharing findings with stakeholders and responding to them, embedding good outcomes processes and verification of the report.

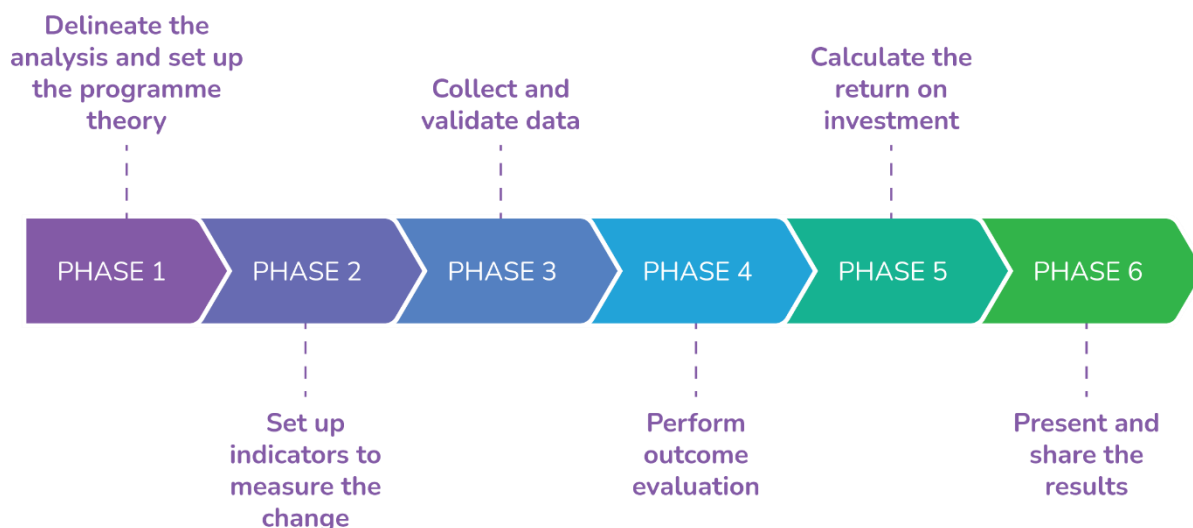


Figure 15: The six phases of the SROI method (source: based on [80]).

The main performance indicator of SROI is a ratio between the cost of investment and the social return gained, translated into a monetary value (C/B).

Methods and techniques to translate impacts into monetary values may be similar to those used by the CBA for non-market values. A further important practical consideration is the amount of staff time and effort required to undertake a CBA or SROI analysis. Implementing measures such as SROI is relatively feasible when information on program outcomes, cost, and revenue is already being collected by an organization [82]

Tips for VARCITIES partners

The three assessment approaches presented in this section may be applied to VSs, bearing in mind some issues related to the particular focus of the VSs (H&WB in cities), as well as their complexity. In particular:

- The traditional approach of CBA will probably lead to the decision of not investing, because of negative indicators such as NPV or a too-long DPB because of the absence or low level of any revenue from direct users. In the case of a CBA willing to monetize indirect benefits by using adequate monetization techniques, the B/C

ratio will probably assume positive values, although this investigation requires some effort.

- The CEA by focusing on the overall costs and the measurement of a specific effect of the project could be not straightforward in the application to a complex and innovative intervention, which has the ambition to provide multiple benefits to the local community.
- The SROI is a promising framework because it is designed to take into account changes perceived as relevant by the stakeholders (those experiencing the intervention) and the attribution of a monetary value may follow different options (including self-estimates, game change, etc.). On the other hand, it is based on a strong involvement of stakeholders and thus it requires a high commitment and dedicated resources to deliver robust results.

Assessment activities within VARCITIES may count on the work done by WP3 in defining baseline information, WP4 concerning stakeholders involvement, WP7 related to KPIs and monitoring, WP9 concerning dissemination and communication.



11 Expected multiple benefits and monitoring structure

To ensure that the achievement of measurable outcomes can be properly recorded, a monitoring protocol of the VS must be established, to ensure that the Key Performance Indicators (KPIs) are monitored continuously. It does not only take into account the monitoring of KPIs, rather it is a more holistic approach where monitoring is effectively carried out at all stages of the project – from *inception* to *execution* – to manage goals and expectations for the duration of the entire project. In the case of VARCITIES, the monitoring protocol is subdivided into:

- the project proposal phase,
- the project planning phase,
- the project execution phase (including operational).

KPIs will be monitored throughout each phase. This project proposal phase monitoring is detailed in Figure 16.

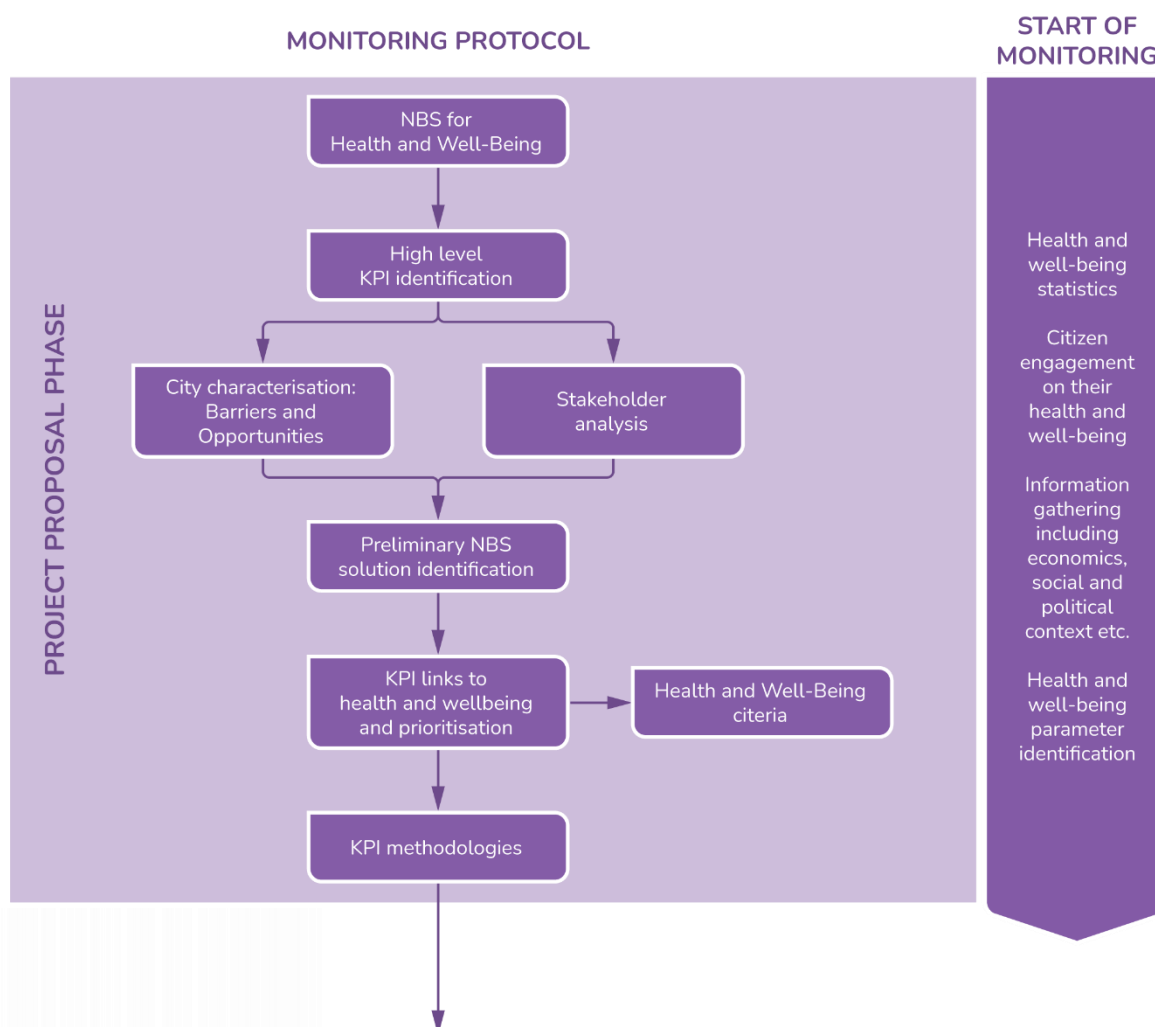


Figure 16: Project proposal phase

KPIs are identified at this stage with consideration of both the characteristics of the city, as well as the stakeholder analysis that will provide the basis for the co-creation process [83]. The preliminary VS needs to be identified and monitored such that they can be modified following the input from the relevant stakeholders. Such KPIs are then linked to the expected impacts on H&WB utilizing H&WB criteria. This helps establish the expected multiple benefits. These can then, later on, be directly monitored. In addition, some priorities need to be given to those KPIs which are directly linked to H&WB to understand better how the KPIs can provide multiple benefits concerning H&WB criteria.

Figure 17 shows the project planning phase monitoring. Stakeholders should be further engaged to guide the co-creation process (see Section 4). Preliminary design mock-ups, as well as a PEST/PESTLE analysis, can be conducted in order to provide refinements to the preliminary VSs (see Section 5). This engagement process can take the form of workshops.

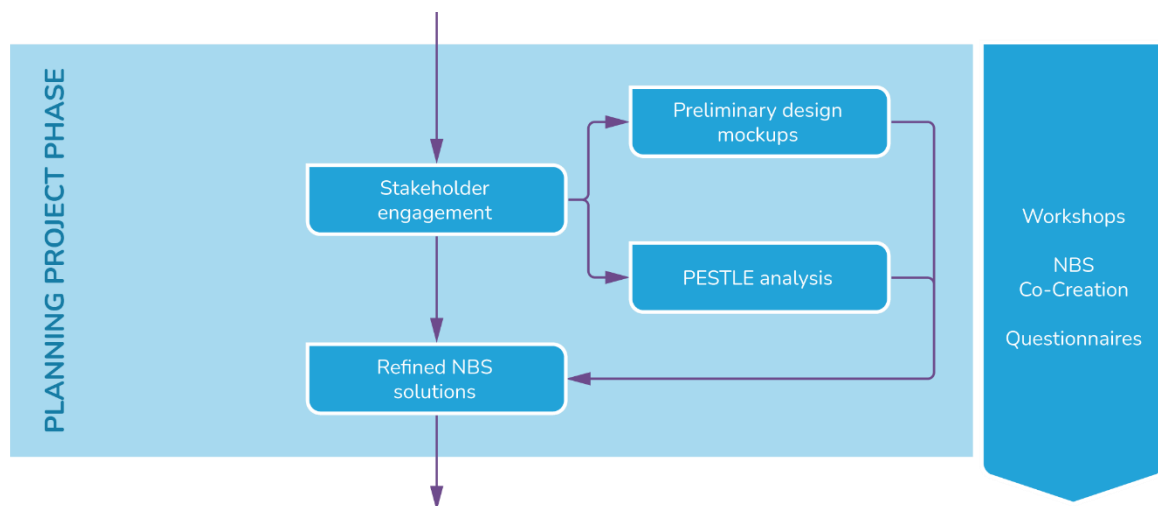


Figure 17: Project planning phase

Once the VSs are established, along with the confirmation of the relevant KPIs, the project execution and its monitoring can initiate. The monitoring approach for this phase is shown in Figure 18. KPI benchmarks need to be established to ensure that the evaluation process can later proceed based on set targets. While it is clear from the outset that such targets may not necessarily be achieved, the project execution must be done in such a way as to ensure that maximum benefits can be attained, reaching or exceeding the benchmarks. The co-beneficiaries of the outcomes are therefore ensured that from inception the project targets the right outcomes which are then confirmed or refuted during evaluation. This provides a basis for the improvement of future replication. During project execution and especially after the completion of works in the operational phase, KPI monitoring will ensure that a proper evaluation process can be carried out on a set of consolidated KPIs.



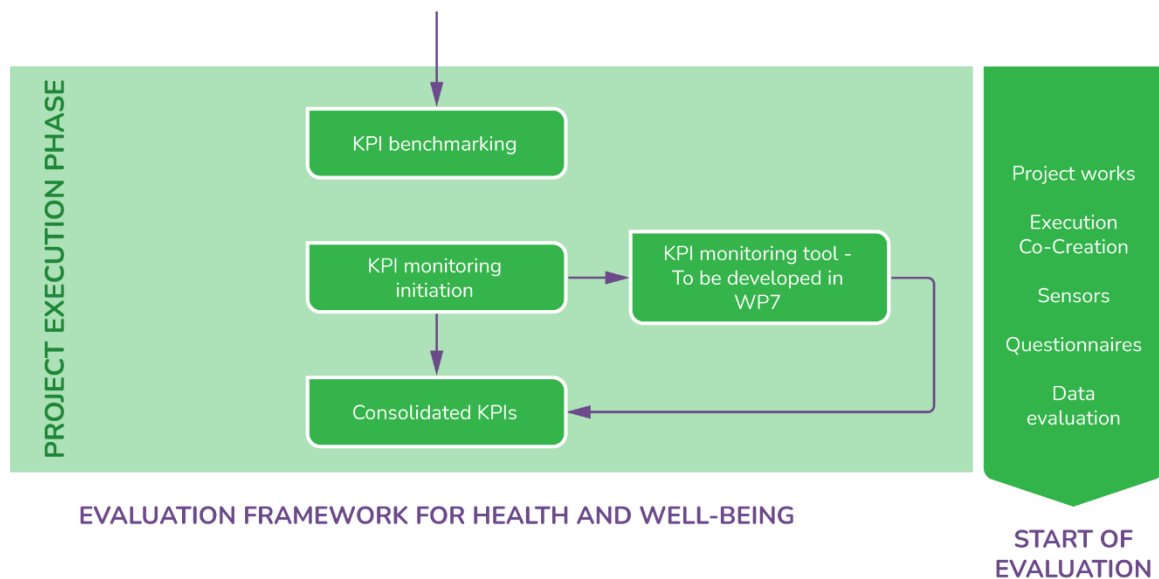


Figure 18: Project execution phase

Tips for VARCITIES partners

The KPI-based monitoring protocol will be implemented in WP7 and is designed to make the acquired data publicly available through the ICT H&WB Platform (see WP5). The full report of expected multiple benefits/impacts (related to KPIs in WP7) will be included in D3.4 “Report on multiple benefits expected from visionary solutions”. This prioritization approach will be detailed in D7.1 (due date M20). During the evaluation campaign, the KPI outcomes would then be compared to these expected impacts so that any discrepancies can be identified and proper guidelines for improvements and eventual replication can be drawn. The evaluation framework will also be detailed in D7.1.

11.1. Explore and consider all the benefits

Several pieces of research have been already done on NBS co-benefits and should be considered also in approaching the VS evaluation.

Co-benefits are intended as the positive side effects emerging (intentionally or not) from the execution and implementation of the project. They are also called “externalities”, ancillary benefits, or side benefits [84] and their identification should come from systematic literature review combined with stakeholders and expert judgment (using surveys or focus group discussions). See for example following Figure 19, where the framework includes four dimensions that may appear simultaneously when implementing NBS in urban areas [85]:

- co-benefits for human H&WB;
- integrated environmental performance (i.e. the provision of ecosystem services);
- trade-offs and synergies to biodiversity, health, or economy; and
- potential for citizens’ involvement in governance and monitoring.

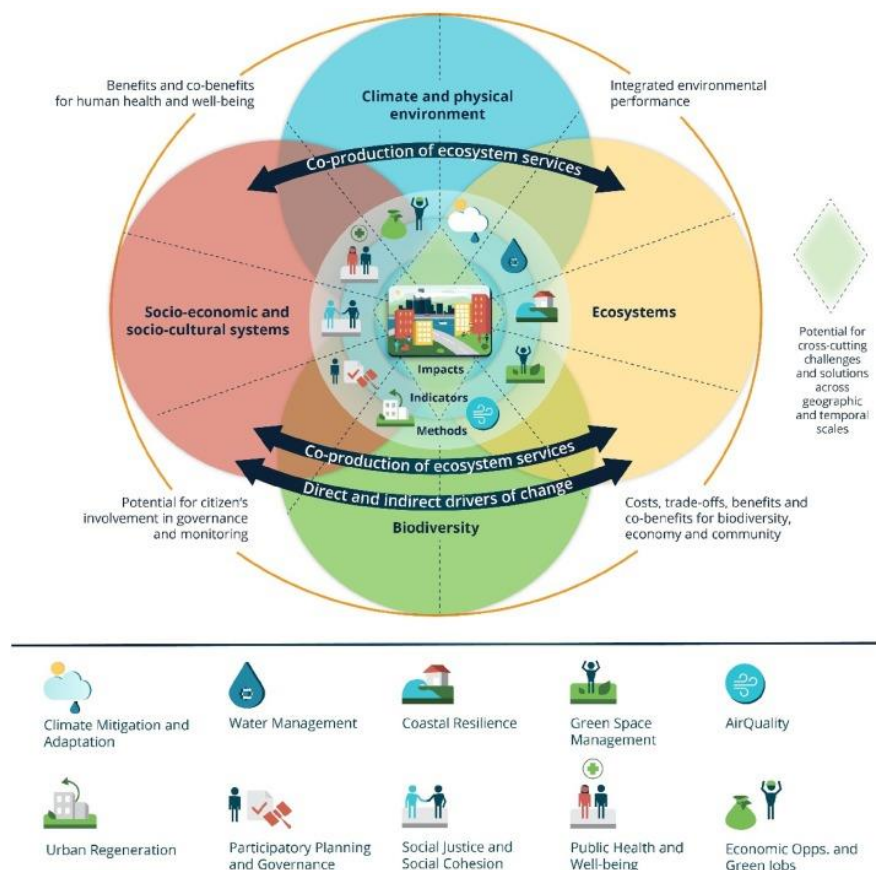


Figure 19: An example of NBS co-benefits assessment framework

Another example of a co-benefits framework related to smart city interventions provided by Figure 20 suggests articulating them around the main pillars of the smart city development [86]

Looking at the recurrent typologies of VS, a new co-benefits framework should be developed. Or, even better, a multiple benefits framework, considering health and well-being not as the primary goal of the implemented project, but without distinguishing a predominant role within the wide range of expected benefits. And including as a remarkable area the “mobility and connectivity”, with related impacts and KPIs.

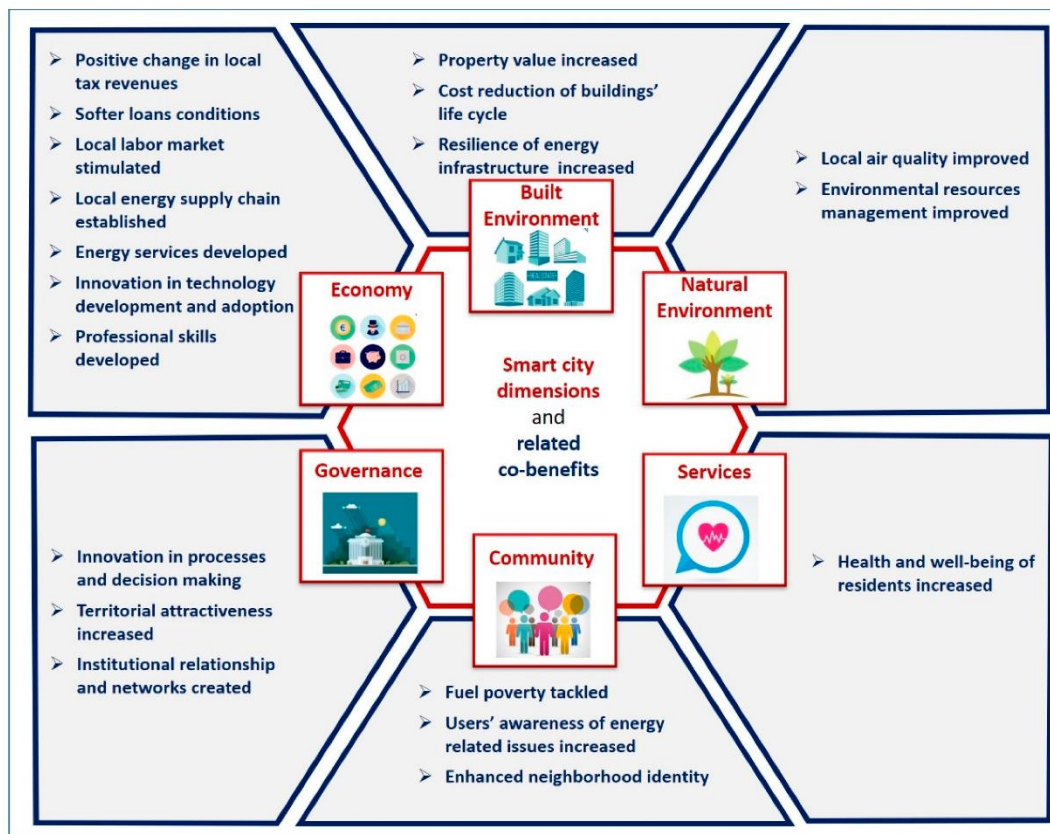


Figure 20: An example of Smart City Solutions co-benefits assessment framework

Tips for VARCITIES partners

The investigation of co-benefits or multiple benefits related to the execution of VSs will be further developed in the D3.4 "Report on multiple benefits expected from visionary solutions". Co-benefits identification will come from systematic literature review combined with stakeholders and expert judgment and will be functional to the execution of evaluation approaches, as those recalled in Section 10.

11.2. Aligning indicators to the SDGs

Various initiatives are developing Key Performance Indicators aiming to frame the impact generated by innovative projects (e.g. smart city development, urban energy transition, nature-based solutions, etc.) according to their specific aim and scope. All these frameworks have some common points and references to the United Nations (UN) Sustainable Development Goals (SDG), and a further convergence to this will make every project or VS able to have a positive impact by explicitly working toward the same goals.

Moreover, the SDGs are the result of years of international negotiation, they are globally recognized and understood. So, it is worth looking towards aligning with them sooner rather

than later. Of course, given the global reach of SDGs, some contextual considerations are needed. First of all, considering the operating atmosphere when crafting outcome metrics, because the VS is expected to act at the local urban level, while the SDGs are referring to a national context. So while it is useful to align with the targets set by the United Nations, it is needed to understand how the VS contributes to those targets.

This will required metrics that reflect VS's immediate outcomes and outputs within the appropriate scope and scale, and a clear line of sight from those organizational outcomes to the larger SDG target. If the SDG indicators do not suffice, it is also possible to borrow metrics from other standards to complement them. Overall, the most important thing is to make sure that the chosen metrics and indicators maintain the integrity of the results and reflect the context [87]. A dynamic assessment approach should be encouraged, to track changes along the project lifetime.



12 Workplan of the Visionary Solution

All the previous design and implementation activities should be defined not only under the economic/financial perspective, but also be clearly defined under the time perspective. By discussing with stakeholders and promoters of the VS, during the co-design phase, the main points should concern:

- What are the main investment steps (e.g. feasibility study, town planning authorization/conformity assessment, preliminary and definitive design, procurement phase, construction/installation, verification and testing, roll-out), when they have to start?
- What are the milestones, when they must be reached?
- Who is responsible for it?

Tips for VARCITIES partners

Anchor the timeline of the VS to the overall timeline of the project:

- Starting of the VARCITIES project: September/2020 (M1)
- Starting of the implementation work package (WP6): November/2021 (M15)
- End of the implementation work package (WP6): February/2024 (M42)
- End of the project VARCITIES: February/2025 (M54)

Please use the following format, referring to VARCITIES months: Start: month/year (Mx); End: month/year (My) - e.g. June/2021 (M10).



13 Conclusions

The main aim of the set of activities described in the deliverable D3.5 is to orientate cities and project promoters along the co-creation path in which visionary ideas are turned into Visionary Solutions for health and well-being.

In these guidelines, we describe some key steps we consider essential in approaching a complex urban transformation, without the presumption of being exhaustive and detailed, knowing that each city is called to adapt the general theory to its local needs, considering the administrative organization, the legal framework, social relationships, ongoing plan, and policies.

Therefore, the guidelines cannot be considered as a substitute for current internal procedures. They are intended to stimulate new thoughts and changing perspectives, by considering that the Visionary Solution will be probably something quite new compared to the previous (urban) project, and the beaching of usual institutional “silos” will be necessary. Therefore openness of mind, as well as some precautions, are needed, to maximize multiple benefits and avoid (or at least mitigate) failures. They should be considered as a decision-support document, to be consulted during the investment co-design and planning phase.

The main beneficiaries of this document are the local clusters referring to the 8 pilot cities directly involved in the VARCITIES project, but the same approach is intended to support other cities coping with similar challenges and willing to test ambitious solutions soon.

Having the deliverable D3.5 as a reference for all the stakeholders involved in the project means creating a common lexicon and understanding of the activities leading to the implementation phase,

By following the specific sections of the document and filing related annexes, each responsible institution will gain awareness of the strengths and weaknesses of its plan: it is not mandatory answering each question and filing all the cells of the annexes, but too many empty fields should be intended as a clear warning. The lack of background information or a poor strategic assessment process may raise some doubts on the possibilities to answer simply and robustly some specific questions, for example: why some solutions have been adopted, how public money or common resources have been used, who is responsible for the decision or contributing to this, what the VS is providing to the local community when the results will become evident, where the ideas are practically translated into reality?

Some procedures might be needed to conduct several times during the co-design process, or in a slightly different order than that of the document. How analytically must be done the work is up to the responsible institution, and it depends on the scope, resource, and time available.

We believe that by following these guidelines the co-design and co-creation phases will become more transparent and ensure the smooth implementation of the visionary solutions.



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15 ANNEXES



ANNEX A – SUMMARY OF THE VISIONARY SOLUTION

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------|-------------------------------|--------------------------|-----------------------------|--------------------------|--|--------------------------|---|--------------------------|---|--------------------------|--|--------------------------|----------------------------|--------------------------|--|--------------------------|-------------------------------------|--------------------------|--|--------------------------|--|--------------------------|
| Title | Provide a concise name to identify the VS | | | | | | | | | | | | | | | | | | | | | | | |
| Motto | <p>Try to explain in a single sentence the purpose of the VS as follows:</p> <p>“The Visionary Solution provides _____ (outputs) to _____ (your beneficiaries / target group) _____ over (the time period) in order to _____ (the main outcomes).”</p> | | | | | | | | | | | | | | | | | | | | | | | |
| Location of the planned investment | City/ district / specific area | | | | | | | | | | | | | | | | | | | | | | | |
| Municipality/local authority/main partners | Please provide the name of the municipality/local authority as well as the name of other local organisation(s) involved. | | | | | | | | | | | | | | | | | | | | | | | |
| Targeted area(s) | <p>Nature Based Solutions</p> <table border="1"> <tr> <td>Buildings Scale Interventions</td><td><input type="checkbox"/></td></tr> <tr> <td>Public Spaces Interventions</td><td><input type="checkbox"/></td></tr> <tr> <td>Interventions in Water Bodies and Drainage Systems</td><td><input type="checkbox"/></td></tr> <tr> <td>Interventions in Transport Linear Infrastructures</td><td><input type="checkbox"/></td></tr> <tr> <td>Interventions in Natural Areas and Management of Rural Land</td><td><input type="checkbox"/></td></tr> <tr> <td>Interventions in Ecological and Habitat Biodiversity</td><td><input type="checkbox"/></td></tr> </table> <p>Smart city / digital solutions</p> <table border="1"> <tr> <td>Sustainable urban mobility</td><td><input type="checkbox"/></td></tr> <tr> <td>Sustainable district and built environment</td><td><input type="checkbox"/></td></tr> <tr> <td>Integrated infrastructure processes</td><td><input type="checkbox"/></td></tr> </table> <p>For others, please specify</p> <table border="1"> <tr> <td></td><td><input type="checkbox"/></td></tr> <tr> <td></td><td><input type="checkbox"/></td></tr> </table> | | Buildings Scale Interventions | <input type="checkbox"/> | Public Spaces Interventions | <input type="checkbox"/> | Interventions in Water Bodies and Drainage Systems | <input type="checkbox"/> | Interventions in Transport Linear Infrastructures | <input type="checkbox"/> | Interventions in Natural Areas and Management of Rural Land | <input type="checkbox"/> | Interventions in Ecological and Habitat Biodiversity | <input type="checkbox"/> | Sustainable urban mobility | <input type="checkbox"/> | Sustainable district and built environment | <input type="checkbox"/> | Integrated infrastructure processes | <input type="checkbox"/> | | <input type="checkbox"/> | | <input type="checkbox"/> |
| Buildings Scale Interventions | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| Public Spaces Interventions | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| Interventions in Water Bodies and Drainage Systems | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| Interventions in Transport Linear Infrastructures | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| Interventions in Natural Areas and Management of Rural Land | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| Interventions in Ecological and Habitat Biodiversity | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| Sustainable urban mobility | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| Sustainable district and built environment | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| Integrated infrastructure processes | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | |
| Overview and objectives of the planned Visionary Solution | <p>Please briefly describe the Visionary Solution, indicating the main goals, the main measures planned and who should benefit from them and how.</p> <p>[max. one paragraph – in case of synergistic Visionary Solutions they can be described as a whole]</p> | | | | | | | | | | | | | | | | | | | | | | | |
| Total investment planned | EUR ¹ | | | | | | | | | | | | | | | | | | | | | | | |
| Funding sources | <i>Requested funding (EU contribution)</i> | EUR/...% | | | | | | | | | | | | | | | | | | | | | | |

¹ All values incl. VAT, if not reclaimable.

| | | | | |
|--|---|-------------------------------|---------------------------------|--------------------------|
| | Own funding | | EUR/...% | |
| | Other sources [please specify] | | EUR/...% | |
| Estimated costs and revenues | Total operating cost (year) | | EUR | |
| | Total revenues (year) | | EUR | |
| Economic viability | Net Present Value ² (NPV) | Internal Rate of Return (IRR) | Discounted payback period (DPB) | Cost/Benefit ratio (B/C) |
| | | | | |
| Expected impacts (based on those identified in the monitoring framework) | Impact name | | Value | Unit |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Social Return on Investment | Social Return on Investment (SROI) | | | |
| | € 1:x | | | |
| | Main outcomes to relevant stakeholders groups | | | |
| Contribution to SDGs | SDG n° and name | | Expected impact | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

² Incl. Information on the discount rate used.

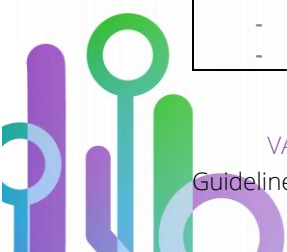
ANNEX B – MAIN CONTACTS OF THE VISIONARY SOLUTION

| | |
|--|--|
| Lead Organization | |
| Organization name | |
| Contact person | |
| Department | |
| Address (Street, No. Postal Code, City Country) | |
| Telephone | |
| E-Mail | |
| Consultancy Support / Local expert | |
| If applicable, please list the external consultant or local experts that support the development of the Visionary Solution and include the contact details. | |
| Organization name | |
| Role | |
| Address (Street, No. Postal Code, City Country) | |
| Telephone | |
| E-Mail | |
| Local ambassador | |
| The ambassadors should be a person on the front line who shares the aims and objectives of the VS to embed an H&WB culture in the local community. He is the “face” of the project in front of the public. | |
| Organization name | |
| Professional title | |
| Telephone | |
| E-Mail | |



ANNEX C – DESCRIPTION OF THE VISIONARY SOLUTION

| |
|---|
| Objectives of the Visionary Solution |
| <p>Try to explain in a single sentence the purpose of the VS as follows:</p> <p>“The Visionary Solution provides _____ (outputs) to _____ (your beneficiaries / target group) _____ over (the time period) in order to _____ (the main outcomes).”</p> |
| Overview of Visionary Solution leader and partners |
| <p>Please describe briefly:</p> <ul style="list-style-type: none"> - The Visionary Solution leader and partners (implementers) and their interest in the project, differentiating between: <ul style="list-style-type: none"> • the organization leading the investment project, and • further organizations associated with it. - The level of commitment of leader to the planned investment project (e.g. municipal council deliberation, board of directors deliberation, etc) <p>Please attach any supporting documents, e.g. letters of commitment/support from associated partners, etc., in the Annex.</p> |
| General project background, context, and rationale |
| <p>Please describe the general context and rationale of the planned Visionary Solution, referring to info gathered on D3.2, e.g.:</p> <ul style="list-style-type: none"> - General framework conditions, incl. relevant (local, national, Eurostat, etc.) statistics regarding the investment territory, population etc.; and a social perspective on the context of the implementation of the project; - Relevant (enabling) policy framework, including political objectives and/or commitments e.g. Sustainable Energy and Climate Action Plans, etc.); - The social context in which the investment project is going to be developed (e.g. neighborhood with particular social connotations or relevant urban functions), if relevant; - Other relevant municipal infrastructure projects by the project promoter(s) that would be running in parallel to the Visionary Solution, if any. <p>Please describe the preparatory assessments and studies carried out in the course of the Visionary Solution development and attach any (summaries of the) performed analyses to the concept.</p> |
| Supporting actions required |
| <p>Please describe if any additional type(s) of support is required in the preparation or will be needed during the implementation of the investment project (e.g. technical expertise, legal advice, procurement preparation, financial structuring, audits, business plans, surveys, crowdfunding/awareness creation campaign, etc.).</p> |
| Description of the Visionary Solution |
| <p>Please describe the envisaged Visionary Solution project, incl. the technical or social measures planned.</p> <p>In this context, please provide details of the underlying technical or social analysis (e.g. results from audits conducted for the project, assessment of suitable technology options, questionnaires and surveys distributed before the intervention, etc.), and refer to the targeted areas including details for instance, to:</p> <ul style="list-style-type: none"> - For public/private buildings: number and type of buildings, surface areas managed, current energy consumption, technology options proposed, etc. - For public/private areas: surface areas managed, land use, etc. - For infrastructure: foreseen energy efficiency improvement, ownership of installations, etc. - For NBS description of species, functionalities, |



| | | |
|--|--|------|
| <ul style="list-style-type: none"> - For services: number of users, etc. <p>Please also describe the approach for aggregation/bundling of various Visionary Solutions, if relevant.</p> <p>The description should be consistent with the visualization</p> | | |
| Summary of VS components | | |
| Please briefly summarise the VS component(s) in Table A. | | |
| Summary of expected impacts and benefits (based on those identified in the monitoring framework) | | |
| <p>Please fill the table below with the results expected from the implementation of the Visionary Solution.</p> <p>Please refer to the Monitoring and Evaluation Framework for details of the calculation, including relevant assumptions, baselines, conversion factors, etc.</p> | | |
| <i>KPI</i> | Value | Unit |
| ... | | ... |
| ... | | .. |
| <i>Other qualitative impacts (social, climate, etc.)</i> | e.g. improved living/health conditions of citizens, reduced pollution, adaptation measures, etc. | |
| Contribution to SDGs | | |
| <i>SDG n° and name</i> | Expected impact | |
| ... | | |
| Replication and/or up-scaling potential | | |
| <p>Please explain how the project can be replicated in other contexts and/or has the potential to be up-scaled (in the city or region/county), highlighting potential partners needed, and referring to:</p> <ul style="list-style-type: none"> - Internal replication/upscaling within current associated organisations involved in the VARCITIES project; - Expansion, associating further organisations; and/or - Replication by others. | | |



Table A – Summary of Visionary Solution components³

| VSx- xxxxx (please specify number and title) | | | | | | | |
|--|---|------------------------------------|-------------------|---------------|-----------------------|----------------------------|------------------------------|
| # ⁴ | Visionary Solution component ⁵ | Brief description of the component | Unit ⁶ | Issue tackled | Expected result (KPI) | Impact (unit) ⁷ | Total investment costs (EUR) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| ... | | | | | | | |
| TOTAL | | | | | | | |

³ All values incl. VAT, if not reclaimable.

⁴ The number of rows can be adjusted as required.

⁵ Specify the investment component, e.g. investment in renewable energy production, apps, sensors, NBS, mobility solutions etc. Use a separate row in the table for each investment component.

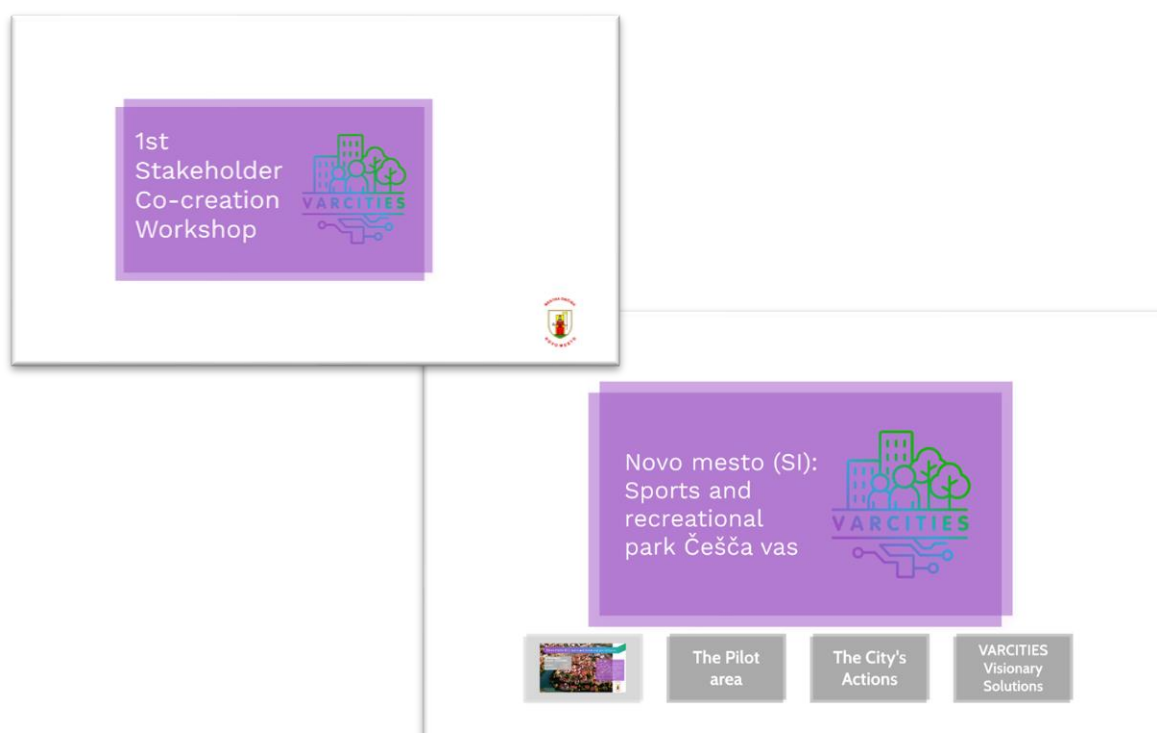
⁶ Specify the number of investments and an appropriate unit, e.g. x number of buildings, trees, square meters, lamp posts, sensors, etc.

⁷ Only if applicable.

ANNEX D – TEMPLATE FOR VISUALISATION

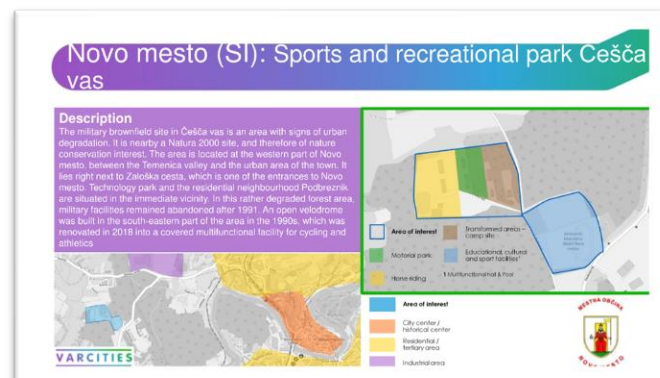
Visualization of the Visionary Solution

- The following template has been set up to facilitate the visual representation of the Visionary Solutions and the co-creation process. It is structured in such a way to provide a clear overview of the state-of-the-art in a given (featuring maps and masterplans, as well as representative photos of the existing situation). Moreover, it presents the City's objectives along with the H&WB links, as well as the different Visionary Solutions are foreseen. Opportunities for co-creation are highlighted and sources of inspiration are provided. In particular:
- Key information is provided regarding the area of interest, based on the data collected during the pilot characterization process (D3.2) (wider area, site characteristics, relevant representative photos).
- The City's Actions are briefly presented about a general master plan, allowing the connection to the Visionary Solutions through specific objectives and their links to H&WB.
- Key information regarding each Visionary Solution is provided, regarding the challenges addressed, the different components, the available budget as well as the foreseen implementation timeline.
- Following the general description of each Visionary Solution, the specific area(s) for the implementation of the different components is specified illustrating the current state through photos.
- General idea boards offer alternative options/ possibilities with the purpose to serve as a source of inspiration and facilitate the discussions with the STKs during the co-creation exercise.

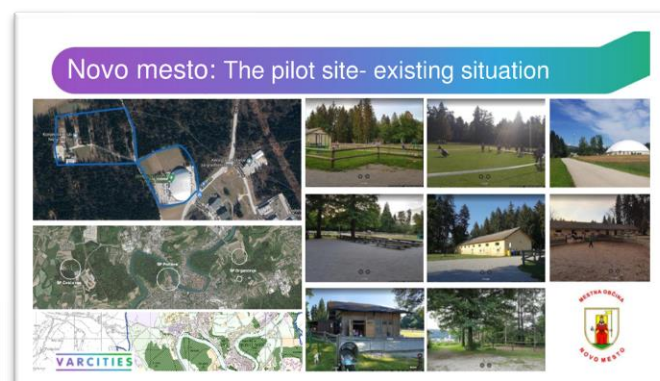


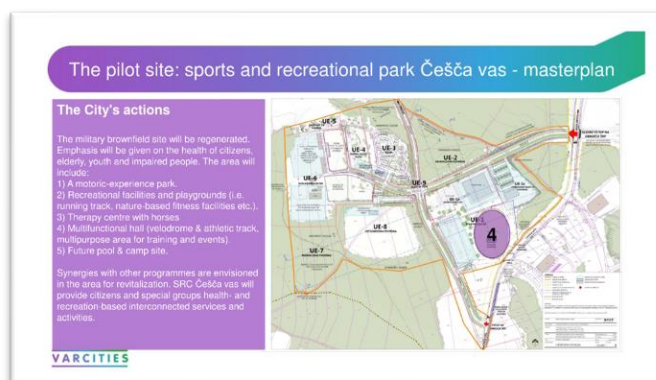
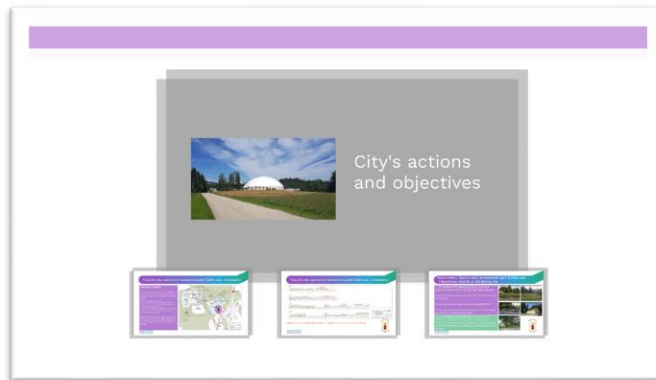


General Intro



The Pilot Area



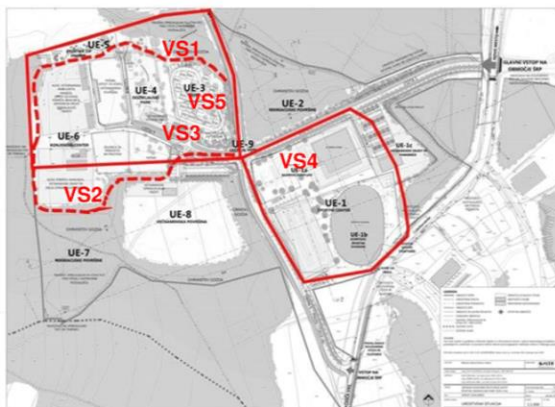


The City Actions

The VARCITIES Visionary Solutions



Novo mesto: The Visionary Solutions on the masterplan



VS1: Brownfield remediation and greening with plant species indigenous to the nearby Natura 2000 areas

VS2: Creating sustainable forest trails

VS3: Interconnectedness of sports, recreational and therapeutic facilities

VS4: Integrated management of the facilities

VS5: IoT solutions for measuring H&WB-being of visitors

VARCITIES



VS1: Brownfield remediation and greening with plant species indigenous to the nearby Natura 2000 areas

| Challenges addressed related to | VS components | Budget | Timeline for implementation |
|---|---|---------|-----------------------------|
| <ul style="list-style-type: none"> Climate mitigation & adaptation, Air/ambient quality, Urban Regeneration, Potential of economic opportunities and green jobs. | 1. Planting of indigenous plant species, 2. Measurements of Air/ambient quality and environmental parameters | €35,000 | Oct 21- Sep 22 |



The military brownfield at the pilot site will be regenerated with plant species indigenous to the nearby Natura 2000 areas. This part of the landscaping also has an educational purpose, as it will inform visitors about plant and animal species located in the surrounding area. From the landscaped part of the recreational park, visitors can take a walk along well-kept forest paths through the natural environment of the river Temenica.

As part of this measure, sensors will also be installed to monitor air quality and meteorological data. These measurements will also allow to track the difference in climate and AQI parameters of this area in comparison to urban centre of the city.

VARCITIES



VS1: Brownfield remediation and greening with plant species indigenous to the nearby Natura 2000 areas



Pilot leader to include here photos of the area(s) of interest



Points of discussion: Selection of area to be remediated and the plant species to be planted

VARCITIES



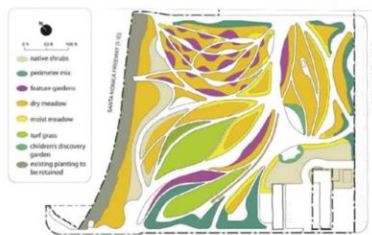
VS1

- Description
- Points of discussion
- Sources of inspiration

VS1: Co-creation process / Sources of inspiration



"A great variety of plant species and sizes – spanning all seasons – will create a rich environment and enhance biodiversity"



Example from Tongva Park and Ken Genser Square, CA, USA.
Landscape Arch: James Corner Field Operations

VARCITIES

VS2: Creating sustainable forest trails



Pilot leader to include here photos of the area(s) of interest, indicating their location on the plan



Points of discussion: Public awareness and educational events/
Possible routes for the Sustainable forest trail

VARCITIES



VS2: Creating sustainable forest trails

| Challenges addressed related to | VS components | Budget | Timeline for implementation |
|---|--|---------|-----------------------------|
| <ul style="list-style-type: none"> Green Space Management, Urban Regeneration, Public H&WB, Potential of economic opportunities & green jobs. | <ol style="list-style-type: none"> Design and construction of sustainable forest trails, Monitoring of visitor data, Public awareness and educational events, Surveys & questionnaires, Information campaigns | €85,000 | Oct 21- Jun 23 |

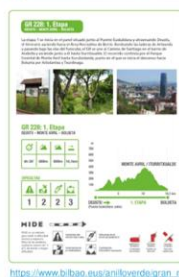
As part of this Visionary solution, sustainable trails in the surrounding mixed forest will be created in order to connect the facilities of the sports and recreational park SRC Češca vas. Public awareness, educational events and information campaigns will be initiated to promote and facilitate the creation of sustainable forest trails. The sustainable forest path will be carried out in the length of 1 km. The trail track will be equipped with information stations providing visitors with information on healthy lifestyle. The route will also be equipped with Sensors for tracking and detecting the movement of visitors for counting and analysis of the visit or use. The trail track is envisaged to "embrace" the area of the recreation park. The trail must also act as part of the pedestrian connection between different parts of the recreation area.

VARCITIES

VS2

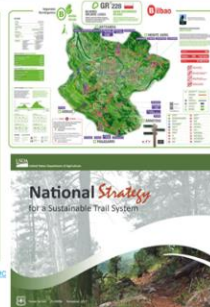
- Description
- Points of discussion
- Sources of inspiration

VS2: Co-creation process/ Sources of inspiration



https://www.bibao.eu/anilko/verdeigran_nco/ordog/229_etapa1_castella.pdf

VARCITIES



"A sustainable trail system is a holistic network of diverse physical and social resources comprised of actual on-the-ground routes and associated community health and economic benefits. It is a resilient system consisting of a wide array of well-planned, well-designed, well-constructed, and well-managed trails that are supported by a mosaic of public and private interests. The system inspires stewardship and invites people of all ages and abilities—and from all backgrounds—to enjoy trails and use them to connect to the land while protecting and conserving natural and cultural resources". "Social, ecologic, and economic considerations are essential elements of a sustainable trail system. Sustainability is achieved at the junction where trails are socially relevant and supported, ecologically resilient, and economically viable"

<https://www.fs.usda.gov/sites/default/files/national-trail-strategy.pdf>

E*ARC
Architects for a Sustainable Urban

VS3: Interconnectedness of sports, recreational & therapeutic facilities

| Challenges addressed related to | VS components | Budget | Timeline for implementation |
|---|--|---------|-----------------------------|
| <ul style="list-style-type: none"> Green Space Management, Urban Regeneration, Participatory planning & governance, Social Cohesion, Public H&WB, Potential of economic opportunities & green jobs. | <ol style="list-style-type: none"> 1. Development of integrated business and environment programmes, 2. Serendipitous design of common resources and facilities, 3. Disabled friendly access in and around facilities 4. Social and educational events, 5. Strategic placement of WiFi hotspots, 6. Surveys & questionnaires, 7. Meetings with STKs | €50,000 | Apr 22- Sep 23 |



VARCITIES



VS3: Interconnectedness of sports, recreational & therapeutic facilities



Points of discussion: Social and educational events, development of integrated business and environment programmes, design and placement of disabled friendly access

VARCITIES



VS3

- Description
- Points of discussion
- Sources of inspiration

VS3: Co-creation process / Sources of inspiration



Social/ Educational Events



Integrated business & environment programmes






Placement of disabled friendly access

VARCITIES



VS4: Integrated management of the facilities

| Challenges addressed related to | VS components | Budget | Timeline for Implementation |
|---|--|---------|-----------------------------|
| <ul style="list-style-type: none"> Green Space Management Participatory Planning & Governance | 1. ICT platform,  2. Sensors  3. Public Screen  | €60,000 | Oct 22- Sep 23 |

The facilities sports, recreational park ŠRC Češča vas will be managed through a common ICT platform, which will include a CRM system as well as collect and manage data collected from IoT sensors deployed at the park. Sensors for tracking and detecting the movement of visitors will give an overview and manage the people flow. Public screens placed in the check-in area of the park will display the data of people flow as well as statistics from aggregated data collected from other IoT sensors deployed at the park. Information technologies will support the overall operation of the park and will connect: the Velodrome and the multipurpose hall, the swimming pool complex, the motor park, the camp, the event space and the activities of the equestrian center. The implementation of a central website with an overview of the offer, occupancy and events, a booking system for all facilities and events, a platform for data management and visitors is planned.

VARCITIES



VS4: Integrated management of the facilities



Points of discussion: Design of GUI for the public screens/ definition of content to be displayed in ICT platform

VARCITIES



VS4

- Description
- Points of discussion
- Sources of inspiration

VS4: Co-creation process / Sources of inspiration



Design of GUI for the public screens

VARCITIES



VS5: IoT solutions for measuring the H&WB-being of visitors

| Challenges addressed related to | VS components | Budget | Timeline for Implementation |
|--|--|---------|-----------------------------|
| <ul style="list-style-type: none"> Social Justice & Social Cohesion, Public H&WB | <ol style="list-style-type: none"> IoT sensors, Wearables and apps | €20,000 | May 22- Jun 22 |



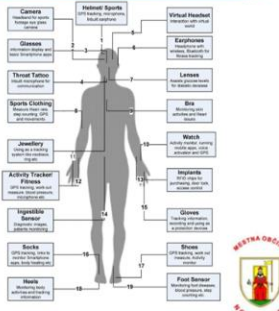
Wearables will be acquired to actively track the activities and directly monitor the H&WB of visitors. Additionally, visitor tracking sensors will be placed at the pilot site to more accurately track the movement of visitors. Furthermore, a dedicated web page/application will be deployed, where visitors will have an overview over their H&WB data collected through wearables.



VS5: Co-creation process



Points of discussion:
Selection of physiological variables to be monitored by health & sports professionals



Saleem, Kashif & Shahzad, Basit & Orgun, Mehmet & Al-Muhtadi, Jalal & Rodrigues, Joel & Zakariah, Mohammed. (2017). Design and deployment challenges in immersive and wearable technologies. *Behaviour & Information Technology*. 36, 1-12.
10.1080/0144929X.2016.1275808



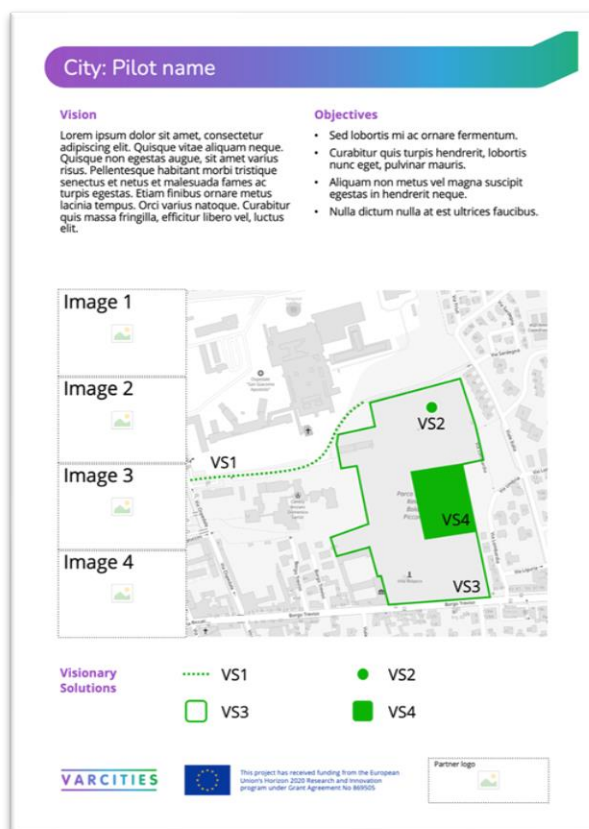
VS5

- *Description*
- *Points of discussion*
- *Sources of inspiration*

Handout template

Visualization of the Visionary Solution

- The following template complements the previous tool described, with a more synthetic scheme for the visualization of VS.
- This tool is conceived to be distributed to the STKs, printed, and hung as a poster during the discussion. The format is A3.
- Key information about the VS is provided, the vision, its objectives and the spatial representation of all the VSs.
- Key information regarding each Visionary Solution is provided regarding the type of VS, the planned components and the challenges addressed.
- Space for inspiring and/or describing pictures is provided.
- A set of icons for various possible components is provided, offering a starting point in the elaboration of VS.



The City Vision,
Objectives and
VSs

City: Pilot name

| | | | |
|------------|-----------------------|----------|--|
| VS1 | Description | | |
| Type of VS | NBS | Energy | |
| | Knowledge / Awareness | Mobility | |
| VS2 | Description | | |
| Type of VS | NBS | Energy | |
| | Knowledge / Awareness | Mobility | |
| • Image 1 | | | |
| | | | |

VARCITIES

City: Pilot name

| | | | |
|------------|-----------------------|----------------|-----------------------|
| VS3 | Description | VS components: | |
| | | 1. Component | |
| | | 2. Component | |
| | | 3. Component | |
| Type of VS | NBS | Energy IoT | Challenges addressed: |
| | Knowledge / Awareness | Mobility | • Challenge |
| | | | • Challenge |
| VS4 | Description | VS components: | |
| | | 1. Component | |
| | | 2. Component | |
| | | 3. Component | |
| Type of VS | NBS | Energy IoT | Challenges addressed: |
| | Knowledge / Awareness | Mobility | • Challenge |
| | | | • Challenge |
| • Image 1 | | • Image 2 | • Image 3 |
| | | | |

VARCITIES

This project has received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement No 888005

Partner logo

The VSs description with inspiring and/or describing pictures

Components

| | | |
|-----------------------------------|-------------------------------------|---------------------------------------|
| User centric design methodologies | Physiological measures | Toolbox |
| For limited mobility individuals | Sensors | Co-design process |
| Questionnaires/Surveys | Tool for data analysis | Educational material |
| Public consultation | Ground and water measuring stations | Digital twin |
| Visual system/Screens | Sound system | Geo-localization of data |
| PV systems | Weather station data | Apps |
| Data from observatories | Record keeping | Public bikes |
| Social & Spatial analysis/Mapping | Outdoor lighting | Meetings/Workshops with citizens/STIs |
| Thermal imaging | Educational installation | Movement sensors |
| Face recognition | Cameras | Digital Wi-Fi/Bluetooth devices |
| Radar based motion detectors | Interactive information | Sensor and satellite measurement |
| Cognitive tests | Environment measurements | Micro-greening interventions |
| Interviews/Focus groups | Wi-Fi hotspots | Learning activities |
| Air measurements | ICT platform/Usage of data | Forest trails |
| Information campaigns | Software installation | Environment programmes |
| Common resources and facilities | Duration stay | Wearables |
| Planting species | Benches | Rainwater harvesting |
| | Low energy lighting | Resting points |
| | | Inventory species tool |

The icon set for possible components applied in the VSs

ANNEX E – STAKEHOLDERS

| Stakeholder analysis | | | |
|---|------------------------------|------------------------------|--|
| <p>Please:</p> <ul style="list-style-type: none"> - describe further stakeholders (civil society, economic stakeholders, etc.) and their possible role for the success of the investment project; - highlight their needs and expectations from the proposed investment project; - indicate their current level of support; and - describe the future envisaged engagement strategy, using the following table. <p>This is further developing the work done by WP4.</p> | | | |
| Type of stakeholder | Current status of engagement | Future engagement activities | Instruments/channels for dissemination and interaction |
| | | | |
| | | | |
| | | | |



ANNEX F – STRATEGIC PLANNING AND ASSESSMENT OF THE VS

| |
|--|
| Results of PESTLE analysis |
| <p>The PESTLE analysis provides you with a structure that allows you to investigate the context in which your organization operates, it prompts you to ask yourself what the external factors of greatest impact on the organization are and to discuss their likely implications.</p> <p>How you categorize each issue raised is not important when using the PESTLE technique because the purpose of this tool is simply to identify as many factors as possible.</p> <p>For example, it is not important to classify an upcoming government regulation as a political or legal issue. The only thing that matters, in the end, is that it is identified as potentially having an impact on your organization.</p> |
| Political factors affecting the planned Visionary Solution |
| <p>What are the key political factors?</p> <p>Please describe the (local, national, and potentially international/EU) key political elements.</p> |
| Economic factors affecting the planned Visionary Solution |
| <p>What are the most important economic factors?</p> |
| Social factors affecting the planned Visionary Solution |
| <p>What are the most important social and cultural aspects?</p> |
| Technological factors affecting the planned Visionary Solution |
| <p>What technological innovations could occur?</p> |
| Legal factors affecting the planned Visionary Solution |
| <p>What current and upcoming legislation could affect the sector?</p> <ul style="list-style-type: none"> - Clarify possible legal/regulatory obstacles and how they will be tackled. - Legal requirements applicable to the planned visionary solution, e.g. regulations concerning: <ul style="list-style-type: none"> o available investment types and framework conditions, o the actual investment approach, or o the structuring and timeline of the single investment steps (incl. public procurement or debt accounting rules), etc. |
| Environmental factors affecting the planned Visionary Solution |
| <p>What are the environmental considerations we should bear in mind?</p> <p>Please also state if an Environmental Impact Assessment (EIA)⁸ is required; if yes and if already conducted, briefly highlight the outcomes.</p> |

⁸ The [EIA Directive \(85/337/EEC\)](#) applies to a wide range of public and private projects in Europe, which are defined in Annexes I and II of the document.



| |
|--|
| Results of SWOT analysis |
| Strengths affecting the planned Visionary Solution |
| Please describe the endogenous factors that can favor the pursuit of VS objectives. |
| Weaknesses factors affecting the planned Visionary Solution |
| Please describe the endogenous factors that can hinder or delay the VS implementation process. |
| Opportunities affecting the planned Visionary Solution |
| Please describe the exogenous factors that can affect positively the VS implementation. |
| Threats affecting the planned Visionary Solution |
| Please describe the exogenous factors that can affect negatively the VS implementation. |

| Risk and mitigation measures | | | | |
|--|--|---|--|--|
| Please outline the critical risks that can affect the Visionary Solution implementation, their likelihood to occur and potential impact on the project as well as corresponding mitigation measures planned to meet the objectives, by using the table below. Please refer to PESTLE and SWOT analysis results (examples of risks include legislative changes, regulatory issues, upcoming elections, financing risks, demand risks, approval risks, unavailability of necessary expertise, etc.). | | | | |
| Risk (description) | Probability (Unlikely – Likely – Very likely) | Impact (Low – Moderate – High) | Risk level (Low -Medium – High – Extreme) | Mitigation measures (description) |
| | | | | |
| | | | | |
| | | | | |



ANNEX G – ECONOMIC AND FINANCIAL ANALYSIS OF THE VS

| Ownership of assets and management structure | |
|--|-----------------------|
| Please describe briefly: <ul style="list-style-type: none"> - The ownership structure of the project leader and partners over the assets concerned; - The (legal) relations between the leading and associated organizations regarding the whole Visionary Solution; - The organizational structure and decision-making processes for the implementation of the Visionary Solution, explaining how decisions are made and who makes them. | |
| Procurement structure | |
| Please specify whether or not the Visionary Solution implementation follows a public investment scheme / public procurement and related legislation. | |
| Estimated costs and revenues | |
| Please specify: <ul style="list-style-type: none"> - The estimated costs per cost category, differentiating between CAPEX and OPEX (equipment and installation cost, staff costs, external subcontracting, maintenance costs, etc.); - Cost savings and other revenues. Please summarise these costs and revenues ⁹ in the table below. Please provide a more detailed forecast (depicting the costs per investment component) on the cash flow development over the lifetime of the investment project in the Annex. | |
| CAPEX (major expenditures foreseen over the long term for the implementation of the VS) | |
| The estimated cost of planning processes | €..... |
| The estimated cost of installation | €..... |
| Estimated equipment cost | €..... |
| Other(s) [please specify] | €..... |
| Total investment cost | €..... |
| OPEX (day-to-day expenses need to ensure the VS operation) | |
| Estimated maintenance cost (n° of years) | €... * (years) = €... |
| Estimated staff cost (n° of years) | €... * (years) = €... |
| Estimated external sub-contracting (n° of years) | €... * (years) = €... |
| Other(s) [please specify] | €... * (years) = €... |

⁹ All values incl. VAT, if not reclaimable.



| | | | |
|--|--|--|---|
| Total operating cost (<i>n° of years</i>) | €... * (years) = €... | | |
| Revenues | | | |
| <i>Land sales</i> | €..... | | |
| <i>Taxation</i> | €..... | | |
| <i>User's fee</i> | €..... | | |
| <i>Lease of advertising spaces</i> | €..... | | |
| <i>Data monetization</i> | €..... | | |
| <i>Avoided costs (e.g. energy savings x years of ...)</i> | €..... | | |
| <i>Energy supply incentives / FiT (year)</i> | €..... | | |
| <i>Other revenues [please specify]</i> | €..... | | |
| Total revenues (<i>n° of years</i>) | €... * (years) = €... | | |
| Economic viability | | | |
| Please complete the table below with the indicators for the investment. | | | |
| Net Present Value¹⁰ (NPV) | Internal Rate of Return (IRR) | Discounted payback period (DPB) | Cost-Benefit ratio (B/C) |
| | | | |
| | | | |
| Financing approach and funding sources | | | |
| Please describe in detail the envisaged financing approach, including the different funding sources (e.g. own funds, grants from VARCITIES project, soft loans, (bank) loans, guarantees, external investments, etc.) and the stage of commitment (i.e. consulted, ongoing, negotiations, contracted). | | | |
| Please indicate the planned funding sources for the investment in the table below ¹¹ , including requested funding. | | | |
| <i>Total investment cost</i> | €...../100% | | |
| <i>Own funding of the promoter / local cluster</i> | €...../...% | | |
| <i>VARCITIES project</i> | €...../...% | | |
| <i>Other sources [please specify]</i> | €...../...% | | |

¹⁰ Incl. Information on the discount rate used.
¹¹ All values incl. VAT, if not reclaimable.

| |
|---|
| Business model canvas |
| Please draft the VS business model by including the required component(s) in Table B. |



Table B – Business model canvas

| | | | | |
|----------------|---------------|-------------------|----------------------|-------------------|
| Key activities | Key resources | Value proposition | Key partners | Key beneficiaries |
| | | | Governance structure | |
| Cost structure | | Channels | Capturing value | |
| | | Cost reduction | | |



ANNEX H – SOCIAL RETURN ON INVESTMENT

Social Return on Investment

Please use the excel spreadsheet (see value map template in Table C) to report the results of SROI analysis.



[illegible]

ANNEX I – WORKPLAN

Work plan

Please clearly state the Visionary Solution project/investment status to date (e.g. status of approvals and permissions, any missing activities to be able to start the project).

Use Table D below to present the next steps in the process to launch the planned Visionary Solution, including work planning and resource allocation.

This is further developing the work done by WP6.



Table D – Work plan

| # ¹² | Investment step | Description of the step | Expected start date | Expected end date | Milestone (Main outcome of the step, verification mean) | Responsible actor (incl. level of commitment) |
|-----------------|-----------------|-------------------------|---------------------|-------------------|--|--|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| ... | | | | | | |

¹² The number of rows can be adjusted as required.