Evaluation protocols and manuals concerning different aspects of the co-evaluation work

Deliverable D3.5

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Authors: UFZ

Contributors: IHE, UNBELGR, TUHH UNEXE, Demonstrators

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Authors (Partner)	Diana Dushkova & Christian Kuhlicke & Oliver Gebhardt (UFZ)		
Responsible Author	Diana Dushkova	Partner	UFZ
Contributors (Partner)	Zoran Vojinovic (IHE), Laddaporn Ruangpan (IHE), Natasa Manojlovic (TUHH), Jasna Plavsic (UNBELGR), Slobodan Djordjevic (UEXE), Demonstrators A and B		

Abstract (for dissemination, 100 words)	The presented deliverable provides a synopsis of reports on indicator-based evaluation activities related to work in Task 3.4 (assessment of implementation plans) performed by Demonstrators. By providing the evaluation protocol and manual, it offers practical recommendations on the ex-post co-evaluation work done in Demonstrators sites as well as suggest the step-wise approach on how to perform the ex-ante evaluation of NBS impact to be used by Collaborators. Additional tools to facilitate and operationalize the process of co-monitoring and co-evaluation of NBS performance are offered in form of Toolbox, Matrix of tools which support the process of selection the most suitable tools for co-evaluation and their practical application (Factsheets of the tools).

Keywords:	participatory approach, co-evaluation, nature-based solutions, hydro-meteorological risk reduction, societal challenges

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Executive Summary

The aim of this report is to provide an easy-to-use step-by-step protocol and practical manual for co-monitoring and co-evaluation of performance of nature-based solutions (NBS) projects. This report is linked to D2.6 where demonstrators have focused on describing the monitoring and evaluation procedures in support of the assessment of their NBS performance in achieving a selected number of sub-goals.

The report provides the protocol and manual, which can navigate and support NBS researchers and practitioners in how to step-by-step operationalize the process of co-monitoring and co-evaluation the performance of NBS performance. It contains information on useful participatory tools that can be applied by also providing information on how and under what conditions to use them. It provides a toolbox, which helps to find the appropriate tool(s) for co-monitoring and co-evaluation of NBS according to the particular plans, goal, resources and capacities. This toolbox consists of many participatory methods and tools and explains how they can be put into practice (see Annex – Factsheets of tools). Using the document might increase the understanding of the value of co-creation and its practical outcomes as well as provides support to involve and engage stakeholders in the phases of co-monitoring and co-evaluation of NBS project.

The report, in particular, the presented protocol and manual, are based on the experience of Demonstrators and their collaboration with local/regional stakeholders providing a practical guidance on how to design, implement and facilitate the process of co-monitoring and co-evaluation of NBS performance in achieving a selected number of sub-goals. Extended with the approaches from existing literature on co-evaluation of NBS, it provides a basis for further co-monitoring and co-evaluation activities in Collaborator sites. Thus, also Collaborators will benefit from the using this report and the suggested toolbox (tools) in the later stages of the realization of their NBS processes.

The presented protocol and manual demonstrate how to set up the process of co-monitoring and co-evaluation of NBS performance more practically and which tools to use to engage stakeholder in productive and just manner.

The report aims to support NBS researchers and practitioners to select helpful and valid tools for the right purpose and at the right moment of co-monitoring and co-evaluation of NBS performance. Using the suggested step-by-step protocol and manual might increase the understanding of the value of co-creation, and support the stakeholders' engagement in all phases of an NBS project.

In the Annex 2 of the report we also present the results of the analysis of evaluation process in Demonstrator sites and lessons learned obtained by means of a survey conducted among the Demonstrators.

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Abbreviations

CCA	Climate change adaptation
DRR	Disaster Risk Reduction
EEA	European Environmental Agency
KPI	Key Performance Indicators
MCA	Multi-Criteria Assessment
NBS	Nature-Based Solutions
NGO	Non-Governmental Organization
RECONECT	Regenerating ECOsystems with Nature-based solutions for hydrometeorological risk rEduCTion
WP	Work Package

Glossary of Key Terms

Co-Benefits	added benefits that result from actions taken to address environmental challenges like hydrometeorological hazards or climate change, and which go beyond direct benefits of a more stable climate or reduced risk (Smith, 2013)
Co-creation / co-production	an approach to collaboratively generate new knowledge, with the aim to increase the social relevance of the knowledge produced for policy and practice applications, and to generate new research questions
Disaster	a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts (UN General Assembly, 2016)
Exposure	the number of people, property, or other elements at risk that can be affected by a particular hydro-meteorological hazard
Hydro-meteorological hazard	a potentially damaging hydro-meteorological event that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Examples of hydro-meteorological hazards include floods, storm surges, droughts, and landslides (McBean, 2016)
Nature-based solutions	actions inspired by, supported by, or copied from nature that aim to help societies address a variety of environmental, social and economic challenges in sustainable ways (EC, 2017)
Participatory approach	according to a theory of participation (Reed et al., 2017; Schuck-Zöller et al., 2017; Smith et al., 2017), participatory approaches include numerous methods that involve different stakeholders who are directly concerned by the result of the work/project in the whole process of NBS (planning, design, implementation, monitoring and evaluation of its impact), to strengthen stakeholders' involvement and promote an environment of learning within and between institutions.
Social innovation	the creation of long-lasting outcomes that aim to address societal needs by fundamentally changing the relationships, positions and rules between the involved stakeholders, through an open process of participation, exchange and collaboration with relevant stakeholders, including end-users, thereby crossing organizational boundaries and jurisdictions (Voorberg et al., 2015)
Stakeholders	persons, groups, and organizations who are, negatively or positively, affecting and/or being affected by current and future hydro-meteorological hazards as well as by the proposed NBS
Vulnerability	the characteristics of the exposed elements in terms of their capacity anticipate, cope with, resist and recover from the impact of a hazard

Introduction

The European Environment Agency – EEA (EEA, 2021; Veerkamp et al., 2021) emphasises the importance of assessment methods including evaluation frameworks and monitoring mechanisms to assess NBS performance, e.g., quantifying multiple benefits and trade-offs of NBS, as well as to improve mainstreaming into regulations, norms and plans, for example, by the use of agreed standards, targets and indicators. NBS assessments enable to measure the 'success' of an individual NBS project and to optimise future management and policy making (EEA, 2021). As mentioned by Wendling et al. (2018) and Kabisch et al. (2017, 2022), evaluating the impacts and co-benefits of NBS broadly requires consideration of environmental performance, human health and well-being impacts, stakeholder involvement, and the transferability or longevity of the action. In RECONECT this was reflected by the development of NATURE, WATER and PEOPLE indicators as well as considered by creating a survey template and related questions to review the evaluation plans in the Demonstrator sites (see section 1).

A systematic review of assessment methods conducted by the referenced EEA reports highlights the lack of structured information on evaluation of NBS performance. Only about 15% of the NBS case studies analysed by EEA (2021) applied monitoring and/or evaluation processes which is often linked to the time limitation/duration of the NBS project or initiative. Nevertheless, the generation and dissemination of monitoring and evaluation data on NBS performance are essential to better inform the stakeholders on the benefits of the proposed NBS as well as vital for development of policies aiming to mainstream NBS in land management and urban development. A limited number of detailed and standardised assessment methods, reporting protocols and (technical) guidance presents a major challenge for upscaling and replication of NBS, which was also emphasised by other European (EC, 2021) and international publications on NBS for Climate change adaptation (CCA) and Disaster risk reduction (DRR) (Donatti et al., 2020, 2022; Vouk et al., 2021).

The term *assessment* refers to a wide variety of approaches, methods or tools that can be used for the critical evaluation of objects, processes or structures at specific points in time or over time in order to inform decisions on complex (often public) issues. In case of assessments that link science and policy (EEA, 2021). According to MEA (2005, p. 35), assessment is defined as a process through which scientists, decision-makers and advocates interact to define relevant questions or issues, mobilize experts and expertise and provide options for decision-makers to consider. There are two kinds of RECONECT activities within this framework. The first one is monitoring to assess the state of the system (e.g. the general conditions in the NBS area), i.e., baseline monitoring before construction of NBS, and the second one is monitoring to assess the performance of implemented NBS towards the achievement of the project's goals/sub-goals.

In the RECONECT context, *evaluation* is understood as a periodic assessment of an NBS that is planned, in the process of realisation or already implemented which answers specific questions related to design, implementation and results (which is in line with the report of EEA, 2021). In terms of the NBS evaluation work, RECONECT addresses evaluation of implemented NBS (i.e., Demonstrators A and B) and evaluation of potential benefits from NBS that are still in the planning stage (i.e., Collaborators). NBS for Demonstrators B have already been implemented whereas for Demonstrators A their NBS are implemented during the course of the project. In both cases, robust evidence base on the performance of NBS will be ascertained. For Collaborators cases, evaluation consists of screening and selecting those NBS measures that are more suitable to the local setting.

Monitoring is the process of systematically collecting and analysing data and information in order to detect signs of change in relation to a (previously identified or determined) baseline (GIZ, UNEP-WCMC and FEBA, 2020; Veerkamp et al., 2021). In the RECONECT context, monitoring can be described as the continuous process of tracking the implementation, measuring NBS performance against expected results and/or comparing these results to reference situations and/or towards certain targets (what is in line with the approach of EEA, 2021).

There are different entry points for an NBS assessment in the context of climate change adaptation (CCA) and disaster risk management (DRM) planning cycles, which relate to and guide the purpose of the NBS assessment – the decision, process or policy it aims to inform. In relation to NBS planning and implementation process, the assessments may be categorised as following:

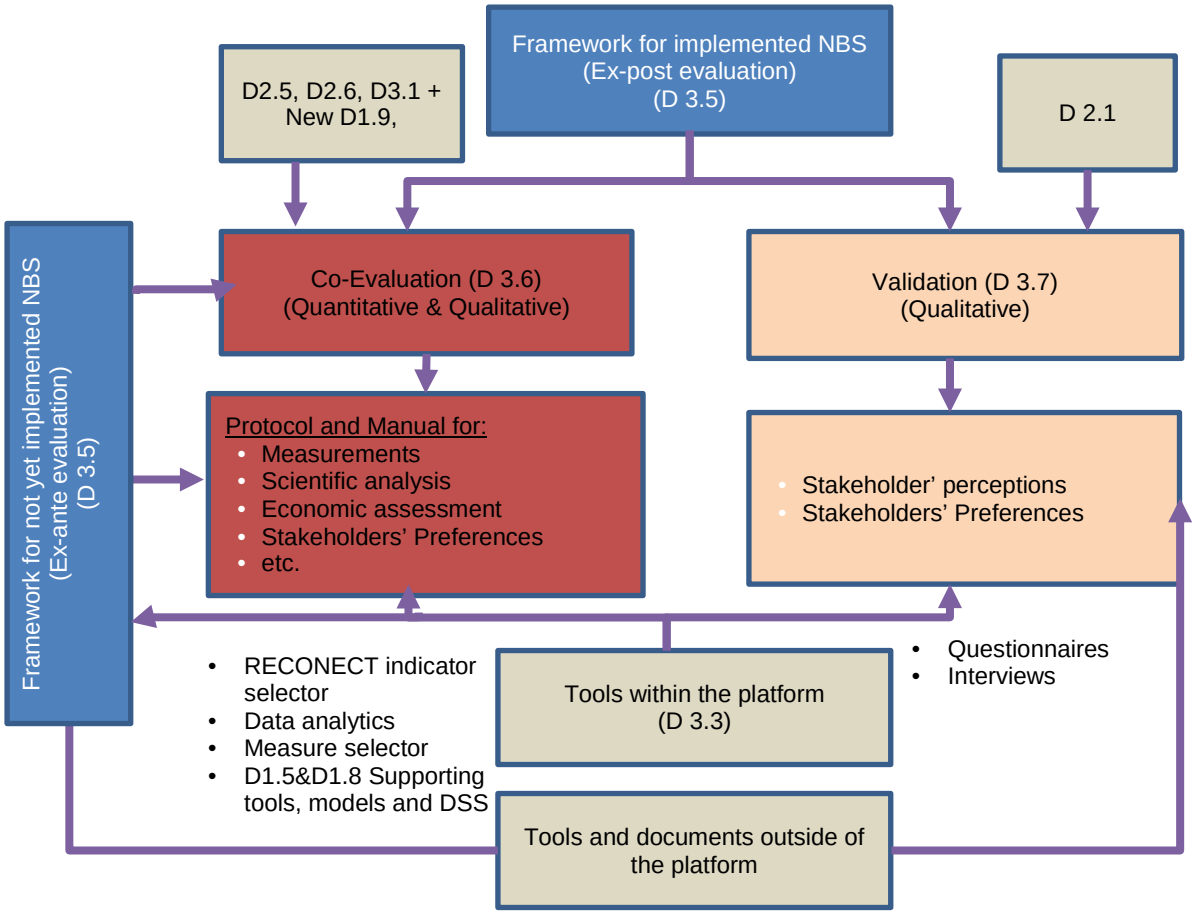
1) ex-ante, i.e., before an NBS is implemented, e.g. for decision support for the selection and design of NBS and assessment of potential impacts,
2) operational phase, i.e., during NBS realisation, and
3) ex-post, i.e., after NBS has been realized, e.g. for evaluating and monitoring of NBS.

These assessments can be technical or physical, as well as oriented towards the economic, environmental or social impacts of the NBS.

Several NBS assessment frameworks, guidebooks and methods have been presented (e.g., Calliari et al., 2019; EC, 2021; Emerton, 2017; GIZ, UNEP-WCMC and FEBA, 2020; Raymond et al., 2017; Rödl and Arlati, 2022; Sowińska and García, 2021). They all underline the collaborative, co-productive approaches including knowledge, expertise and direct personal experiences of relevant stakeholders as particularly relevant for robust NBS impact assessments. This recommendation guides our co-evaluation activities in the RECONECT project.

The aim of this report is to provide an easy-to-use step-by-step protocol and practical guide/manual, incl. a hands-on toolbox for co-monitoring and co-evaluation of performance of nature-based solutions (NBS) projects. This report is linked to D2.6 where demonstrators have focused on describing the monitoring and evaluation procedures in support of the assessment of their NBS performance in achieving a selected number of sub-goals. Therefore, the report also presents the results of the analysis of evaluation process in Demonstrator sites and lessons learned obtained within a short survey conducted among the Demonstrators. It also provides the toolbox, which helps to find the appropriate tool(s) for co-monitoring and co-evaluation of NBS according to the particular plans, goal, resources and capacities. This toolbox consists of many participatory methods and tools and explains how they can be put into practice.

Figure 1 depict different details of the framework and its relationships with related deliverables (e.g., D1.9, D2.1, D2.5, D2.6, D3.1, D3.3, D3.6 and D3.7), tools and documents which will be available either through the RECONECT Services Platform or at the project database.



Source: RECONECT project team

Figure 1 RECONECT framework for evaluation of NBS (ex-ante and ex-post evaluation)

As illustrated in Figure 1, the RECONECT NBS ex-post evaluation framework consists of two pathways, the co-evaluation path and the validation path. The co-evaluation part mainly involves the work based on measurements, scientific analysis and economic assessment (i.e., quantitative evaluation) combined with stakeholders' preferences (i.e., qualitative evaluation). The validation part is primarily concerned with an in-depth analysis of stakeholders' perceptions and preferences and is provided as a separate deliverable D3.7.

It can be also noted that some aspects of the Ex-post evaluation are supported by the tools implemented within the RECONECT Services Platform (D3.3) as well as by the tools and documents which can be located on the project database (i.e., outside from the platform). Examples of tools that can be found on the RECONECT Services Platform (as described in D3.3) are indicator selector tool (currently in Excel format and will be web-based), various plots/dashboards supported (i.e., data analytics), measure selector tool and others. In addition, tools and documents supporting co-creation can be found in D1.9.

1 A protocol and manual for co-evaluating NBS

This chapter is intended to serve as a protocol and manual describing a general procedure on how to co-monitor, co-assess and co-evaluate the (co)benefits/impact of NBS within a framework of co-creation. This protocol shall help Collabolators of RECONECT, but also other project's practitioners, policy-makers etc. to plan and realise their evaluation approach along a shared protocol. The protocol and manula suggests a six-steps-procedure for preparing and realitzing the co-evaluation of NBS impact. It also provides more specific recommendations and contains step-by-step instructions guiding users through the process of co-evaluation.

The chapter is based on on D2.6 where a nine-steps process of NBS evaluation was suggested:

1. Definition of overall NBS project objectives, which are also referred to as goals and sub-goals. These goals represent themes or topics within the WATER, NATURE, or PEOPLE challenge area, and sub-goals are subthemes within those goals that reflect NBS project objectives. It is important to involve relevant stakeholders in setting these objectives.

2. Recognition of key NBS project activities that will contribute to achieving the objectives or sub-goals. This step is important to ensure that the monitoring and evaluation plan is comprehensive and covers all relevant activities.

3. Identification of expected outcomes of the NBS project activities. These outcomes should align with the objectives or sub-goals and will be used to measure the performance of the NBS project.

4. Specification of indicators that will be used to measure the expected outcomes. The "RECONECT Indicator Selection Tool" developed in WP3 can be used to select suitable indicators per sub-goal.

5. Investigation and determination of data sources that will be used to measure the indicators. This step is important to ensure that the data is accurate and reliable.

6. Development of a data collection plan that includes the timing, frequency, and methods for collecting data. This plan should be reviewed and approved by relevant stakeholders.

7. Collection of data using the methods outlined in the data collection plan.

8. Data analysis to determine if the expected outcomes have been achieved and if the NBS project is on track to meet its objectives or sub-goals.

9. Communication of results of the monitoring and evaluation to relevant stakeholders and use the information to make decisions about the continuation or adjustment of the NBS project.

The initial nine-steps-process was enhanced and developed towards a more comprehensive approach. However, each of the single steps is included in the updated version. It is based on the work within WP2 and WP3 as well as on a number of collaborative actions involving local authorities, the civic sector, SMEs, and research institutes, with the aim of providing a significant and comprehensive evaluation of NBS, which can be translated into informed policies and targeted interventions aimed at promoting NBS for hydro-meteorological risk reductions in natural

areas. It also included the guidelines of the EKLIPSE – Expert Working Group (EWG) on NBS evaluation and Handbook for practitioners (EC, 2021).

As already mentioned, an evaluation framework of RECONECT includes evaluation of implemented NBS (i.e., Demonstrators A and B) and evaluation of potential benefits from NBS for areas that are subject to hydro-meteorological risk (i.e., Collaborators). For both Demonstrators A and B, a robust evidence base on the performance of NBS will be ascertained. For Collaborators cases, evaluation consists of screening and selecting those NBS measures that are more suitable to the local setting.

An evaluation protocol describes what are the goals and outcomes of evaluation and how to go about doing it (e.g. steps of evaluation process). At this point it is also important to consider what resources are needed, how to manage the data, what the ethical issues are, and how to report on and disseminate the findings.

A RECONECT Evaluation protocol provided below is aiming to three main purposes (Figure 2):

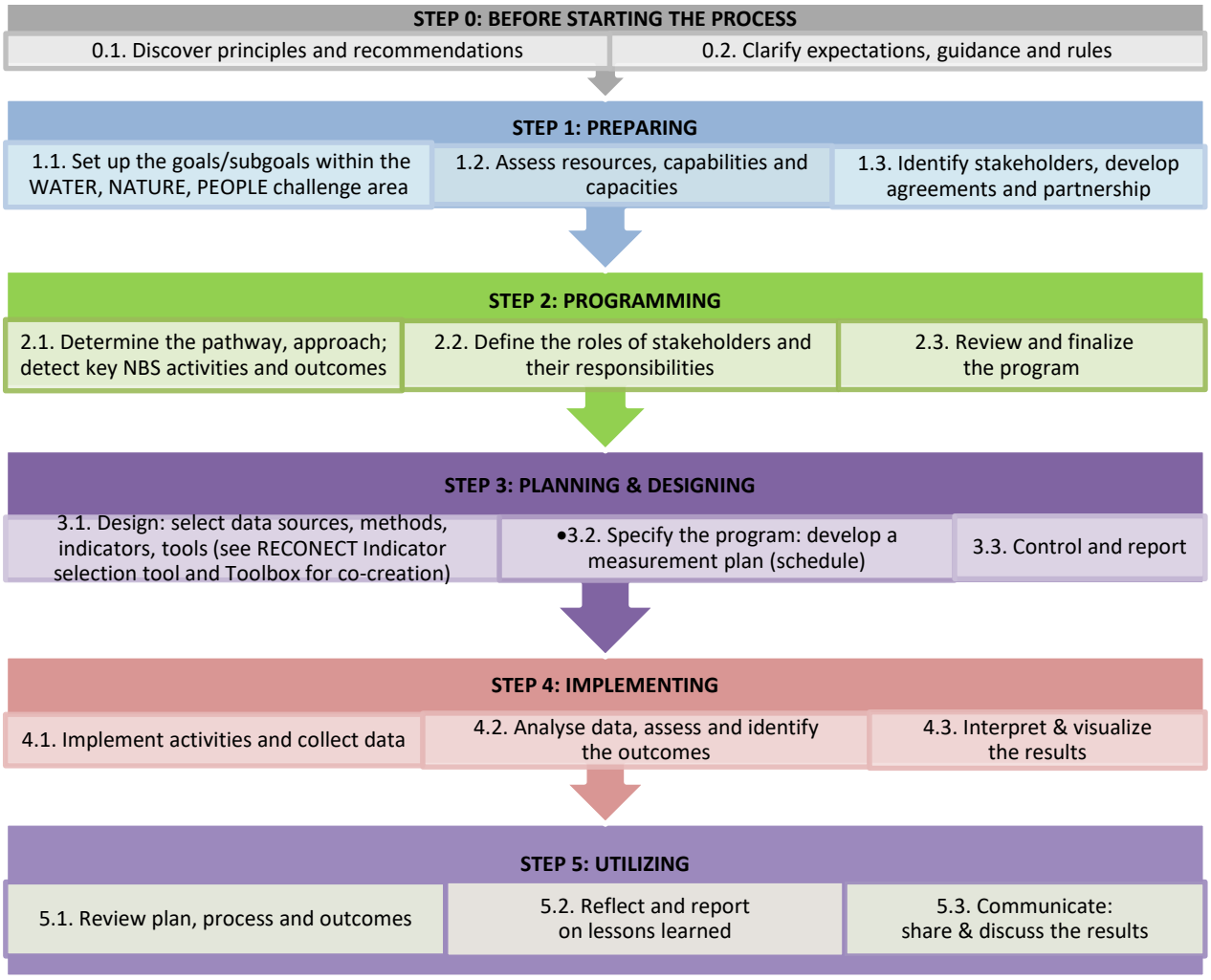
- assuring accountability;
- supporting management;
- driving learning, capacity building and innovation (incl. drawing lessons learned from experience.

In doing so, evaluation enhances learning and innovation by assessing to what extent particular interventions, strategies or policies have worked or not, how and why. Understanding the reasons for success or failure supports in scaling up successful approaches and avoiding making the same mistakes over again.

Source: authors

Figure 2 The purposes of RECONECT evaluation protocol

Figure 3 provides a six-steps-evaluation protocol, each of the steps are described in detail below as a manual.



Source: authors

Figure 3 RECONECT protocol for co-monitoring and co-evaluation

1.1 Step 0: Before starting the process

Step 0.1. Discover principles and recommendations

Before starting the process of co-monitoring and co-evaluation. It is recommended to have a look at the Manual for practitioners on co-creating NBS (new D1.9). There are different *principles* (rules of actions or conduct) that are relevant for setting up a successful co-creation process. By looking at different co-creation strategies applied to the NBS process by several NBS projects, we have identified seven core principles underpinning a co-creation process (Table 1). All these principles should be evident throughout the whole process of NBS co-creation, also during co-monitoring and co-evaluation stage. They facilitate the design, evaluation and adaptation of 'good' co-creation processes. Additionally, they ensure that groups designing co-creation pay attention to specific local contexts, questions and needs. Summing up, the fundamental principles of co-creation and its design can be formulated as following:

(1) engagement of citizens and stakeholders in co-creation through collective governance and shared results are main principles of co-creation process;
(2) stakeholders' collaboration should be equal, flexibly structured, ongoing and participative, transparent, productive, supported by all and user-oriented;
(3) co-creation should be place-based considering the local contexts.

Table 1 Main principles for designing a co-creation strategy for NBS realization

Source: own elaboration based on principles from: CLEVER Cities – Morello et al. 2018, CONNECTING Nature – Hölscher et al. 2020, OPERANDUM & PHUSICOS– Strout et al. 2021, Lupp et al. 2021, ThinkNature – Somarakis et al. 2019, UNALab – DeLosRios-White et al. 2020, URBiNAT – Nunes et al. 2021; and from Albert et al. 2020, Cohen-Shacham et al. 2019, Franzeskaki 2019, Jansen and Pieters 2017, Kabisch et al. 2022)

Principle	What is it about?	Why to apply?	How to apply /address?
1. Inclusivity	All groups of stakeholders (incl. citizens) are engaged in the process of co-creation	Real collaborative engagement will lead to greater buy-in from stakeholders and to design of NBS better suited to its context, both physical and social. As a result, greater co-benefits are likely to be achieved.	• define who will be involved and why; • agree on how you are going to ensure that the co-creation process is inclusive; • make sure that the experience and perspective of all stakeholders are recognized and valued (diversity); • ensure that the process enables empathetic dialog and equal participation of all
2. Doing together	Co-creation is expressed through collective governance	To ensure that the process is truly participative, that means shift towards empowering the community rather than just consulting or documenting.	• ensure that local knowledge is not 'extracted' by outsiders, but shared by the community, which is involved in problem-solving processes from the start; • check that the co-creation in practice motivates people, inspires participation, enables sharing results, continuing development and delivering results at many levels.
3. *Openness, clarity and transparency*	Being open about content, process information, roles and practical tips; promoting clarity, involvement, trust and insights	Openness and transparency are key ingredients to build accountability and trust to your NBS intervention. It helps to convince stakeholders that NBS produces societal benefits in a fair, equitable way.	• share and connect –people, groups, and interests; • ensure that people can see what you are doing; • build open approach via active listening; • promote broad participation
4. Legitimacy	Conformity of the process to the law or to rules; ability to be defended with logic or justification; validity.	In order to ensure that the co-created intervention has an ability of being reasonable and acceptable.	• check that the co-creation process is legitimate and in accordance with norms and values within a society
5. Linking knowledge and action	Actionable and usable knowledge for policy, planning and empowerment	• to reveal how to better facilitate empowerment of the stakeholders; • to realize how to better involve them in design, delivery & stewarding of NBS	• agree on what types of knowledge and results you want to generate
6. Increasing synergies & silo-busting	Extending institutions for more synergy; breaking silos between departments and disciplines as well as in decision-making procedures	• to increase synergies between institutions; • to break/bust silo mentality in order to overcome barriers and divisions between departments, groups of people, etc.	• apply multidisciplinary research is favoured instead of silo research • try to involve and connect as many as possible different departments in the municipality/government/organisations (indirectly and directly) making connections from one team to another (e.g. through co-creative workshops)
7. ***Productivity***	Added value through side-effects (spin-offs) to the long-term impact of co-created projects.	• to bring co-benefits and future spinoffs in shared results; • to enable a cultural paradigm change and future spin-offs.	• appoint, empower and support a competitive co-creator (with time, money, resources, budget, power); • keep the enthusiasm and momentum ongoing.

Step 0.2. Clarify expectations, guidance and rules

Clarifying expectations is about the creation of shared vision and agreement on what is to be done up front. Expectations to be clarified include daily actions, attitudes, practices that help you reach your goal. This step also helps you to get a general understanding of the goals and objectives of co-monitoring and co-evaluation, explaining how to determine what work needs to get done. Additionally, it enables to define areas of responsibility upfront and be prepared to redefine responsibilities as well as deal with possible barriers, considering the strengths and weaknesses of potential team (collaboration of internal team and different groups of stakeholders).

1.2 Step 1: Preparing

Step 1.1. Set up the goals and sub-goals within the WATER, NATURE, PEOPLE challenge area

This step includes the definition of overall NBS project objectives, which are also referred to as goals and sub-goals **(step 1 of D2.6)**. "Goals" and "Sub-goals" are those objectives that the NBS aims to achieve. This step is important to ensure that the monitoring and evaluation plan is comprehensive and covers all relevant activities. These goals represent themes or topics within the WATER, NATURE and PEOPLE challenge area (e.g., water quantity, water quality, habitat structure, biodiversity, socio-economics and human well-being) whereas sub-goals are subthemes within those goals and reflect NBS project objectives (e.g., flood risk reduction within the water quantity goal).

Use Table 2 to list the goals and sub-goals addressed by the NBS in regard to each challenge area and match the goals and sub-goals to the ones represented in the "RECONECT Indicator Selection Tool" (see a named list for all sub-goals in the second column (A – challenges, B – goals, C – sub-goals) as it will be easier to identify them in the following parts of the document when describing the monitoring and evaluation plans under the different sub-goals. In the column "Explanation/reason" provide a brief explanation of the reason why the NBS addresses the sub-goal.

Table 2 Goals and sub-goals addressed by NBS

Source: "RECONECT Indicator Selection Tool"

Challenges	Goals (select Goals from the "RECONECT Indicator Selection Tool")	Sub-goals (select Sub-goals from the "RECONECT Indicator Selection Tool")	Explanation/reason why the NBS addresses the Sub-goal
WATER	Water quantity	Flood risk reduction	
		Coastal flood risk reduction	
		Groundwater management	
		Drought risk reduction	
		Landslide risk reduction	
	Water quality	Improve water quality in rivers/watercourses, lakes/ponds	
		Improve coastal water quality	
		Improve coastal water quality	
		Improve groundwater quality	
NATURE	Habitat structure & Biodiversity	Increase habitat area (quantity)	
		Habitat provision and distribution (quality)	
		Ecological structure and physical structure of habitat	
		Shifts in land use and land cover	
		Maintain and enhance biodiversity	
		Reduce disturbance to ecosystems	
PEOPLE	Socio-economics	Increase recreational opportunities	
		Education and awareness about NBS	

Challenges	Goals (select Goals from the "RECONECT Indicator Selection Tool")	Sub-goals (select Sub-goals from the "RECONECT Indicator Selection Tool")	Explanation/reason why the NBS addresses the Sub-goal
		Maintain and if possible enhance cultural values	
		Enhance use of the NBA area	
		Improve Community Cohesion	
		Encourage new business models and other community benefits provided by NBS	
		Stimulate/increase economic benefits	
		Improve psychological well-being	
		Improve physical well-being	
		Better air quality	

Step 1.2. Assess resources, capabilities and capacities

This includes the process of defining the amount of work to be done by the resources. It relates to gaining complete visibility into your resources' strengths and weaknesses. Assessing resources and capacities relates to analysis of conditions enabling co-creation (resources, capacities, effort) which was also previously explained in the Manual for practitioners (see D1.9). Summarizing them, it means you need to identify and assess the following aspects:

a) with how many stakeholders will you organize the process of co-monitoring and co-evaluation (group size): a) small group: 1-5 people; b) middle group: 6 to 12 people; c) large group: from 13 up to 100 people and more,
b) how much time will you be able to invest: a) less time-consuming co-creation activities: 30-60 min; b) middle time consuming: 0,5-1,5 h preparation and 1-2 h activity; c) highly time consuming: long preparation, several rounds of activities, post-event analysis,
c) how experienced you need to be in doing the certain activity (e.g. which level of difficulty/ effort for certain co-creation activity match your expertise): a) tools that are relatively easy to apply; b) tools that need certain expertise to apply; c) tools that require profound expertise/experience,
d) what budget is required to use the tool, in this regards tools identified as being a)inexpensive, b) moderate and c) expensive,
e) what level of facilitation is needed (ranging from a) beginner, b) medium, to c) advanced).

Answering these points helps you to select the most suitable tools for co-monitoring and co-evaluation using a Matrix of tools (see Table 5 of step 3.1 and also Annex of this deliverable where the Factsheets for every tool are provided).

Step 1.3. Identify stakeholders, develop agreements and partnership.

This step is an important preparation activity (Planning and design) **(step 1 of D2.6)**. It is important to involve relevant stakeholders in setting the goals and sub-goals (step 1.1) within the WATER, NATURE and PEOPLE challenge area. According to the RECONECT typology of stakeholders to be involved in the NBS realization, there are five main groups: 1) academia & research (centres) (knowledge-based organizations), 2) public authority & political representation; 3) private sector organizations; 4) civil society organizations; 5) media. Each of these groups has its particular reasons for the involvement, needs and requirements as well as expectations from the NBS project and thus can be considered for producing the certain type of innovation (see Table 3).

A number of tools is suggested to engage stakeholders in the process of NBS realization and in particular in monitoring and evaluation of NBS impact (see step 3.1, Matrix of tools and Annex with the Factsheets for each tool):

- user personas;
- actor/stakeholder mapping;
- stakeholder CV tool;
- stakeholder visualization;
- people shadowing;
- people and connections map;
- expert interview;
- team canvas;
- service blueprint;
- skill share;
- who inspires us;
- building partnership map;
- world café;
- focus group;
- sketch mapping;
- future search conference.

Decide on the level of co-creation you want to achieve with your activity (it is also needed for tool selection and addressed in the Matrix of tools provided in Table 5). Consider that each level of co-creation is aiming at certain engagement activities expanding from:

- informing stakeholders (one-way passive engagement, when the co-creator aims to inform about the project),
- consulting (based on the two-ways dialogue aiming to get a consultation in form of interviewing, surveying, etc.),
- collaborating (means initial engagement where we involve people in the co-creation through the establishing of partnerships etc.),
- to empowering (active engagement where stakeholders are the main actors and equal project partners).

With this step you also need to define how stakeholders will be invited and involved. There are different ways of stakeholder involvement:

- direct – through invitations
- indirect – via public advertisements, internet, social media, newspapers, TV, radio, etc.
- through motivation – extrinsic motivation such as financial, or intrinsic motivation such as social inclusion).

You also need to decide how will relevant information be shared with stakeholders (e.g. using email or sending digital information sources, by sending prospects, brochures, booklets, etc., or through direct contact or during public events, but also with the use of social media).

And finally, you have to ensure a mutual understanding, e.g. via memorandum of agreement, contracts, other official documents, or informal agreement but indicating the activity conditions & tasks. Here again, consider seven key principles of co-creation provided in Table 1 (inclusivity; doing together; openness, clarity and transparency, legitimacy; linking knowledge and action; increasing synergies & silo-busting; productivity).

1.3 Step 2: Programming

Programming is the process of creating a set of instructions that explain how to perform a task. Thus, within the step, a program for co-monitoring and co-evaluation will be created as a series of steps (actions) in sequence to carry out a plan. In particular, developing a program (e.g. a series of steps/actions) consists of three sub-steps:

Step 2.1. Determine the pathway, approach; detect key NBS activities and outcomes

At this step you should determine a path / a route which you can take to reach the goal and sub-goals (defined previously within the step 1.1). In other words, determining the pathway enables you to realize a particular course of actions as well as a way of dealing with them (=approach) to achieve your goals. For this purpose, recognize/define the key NBS project activities that will contribute to achieving the goals or sub-goals **(steps 2 of D2.6).** It is important to ensure that the monitoring and evaluation plan is comprehensive and covers all relevant activities (Table 3).

At this stage you also should identify expected outcomes of the NBS project activities **(step 3 of D2.6).** These outcomes should align with the objectives or sub-goals and will be used to measure the performance/impact of the NBS project.

Table 3 Examples of detected key activities in relation to goals and sub-goals addressed by NBS

Source: Reports from Demonstrators, RECONECT D2.6

Challenges	Goals	Sub-goals	Impacts	Indicators	Key activities
WATER	Water quantity	Flood risk reduction (any recorded flood event before the NBS implementation can be used to compare the situation / to evaluate)	Lowering of the water level	Slowing and storing run-off/flood peak reduction	Data collection on the river water level related to the existing gauging stations in the river catchment. Add here co-creation activities / tools (see Annex)
			Reduction of the inundation time / Flood hazard reduction	Flood hazard	Data collection from gauging stations that deliver the water level in real time (maximum peak of the water level, duration of inundation, etc.). Add here co-creation activities / tools (see Annex)
			Economical savings from operating the pumping stations	Delay time to peak	Data collection from gauging stations on the operation of the pumping station related to the water level. Add here co-creation activities / tools (see Annex)
			Reduction of the total amount of water	flood peak reduction **pumping stations	Data collection from gauging stations on the operation of the different pumping stations related to the water level, to know the amount of water leaving the system through the pumping stations. Add here co-creation activities / tools (Annex)
NATURE	Habitat structure / provision (to define habitat units in order to assess the habitat size)	Increase habitat area (quantity)	Changes in habitat sizes	Habitat area	Mapping of vegetation for the targeted habitats in the area, incl. field survey, GIS, LIDAR, etc. Add here co-creation activities / tools (see Annex)
		Habitat provision and distribution (quality)	Change in location of habitat borders	Location of habitat borders	computation of the habitat patch size and number based on spatial GIS analysis supplemented with field verification. Add here co-creation activities / tools (Annex)
	Biodiversity	Maintain and enhance biodiversity	Increase in biodiversity of flora and fauna	Species richness and composition	Mapping of the species (count data) along the rivers in a periodic time after NBS implementation (qualitative: species presence/absence; quantitative – abundance data of each species) by mapping and field visits. Add here

Challenges	Goals	Sub-goals	Impacts	Indicators	Key activities
					co-creation activities / tools (see Annex)
PEOPLE	Socio-economic	Increase recreational opportunities (estimating the number of visitors and activities of visitors before and after NBS implementation)		Number of people that visit or spend time in the NBS area	Data collection on number of visitors (installation of people or counters/sensors at the access points, hourly/daily counting). Add here co-creation activities / tools (see Annex).
				Enhancing attractiveness of places for living and working, and to visit	User/visitor on-site and on-line survey in combination with the count data (purpose of the visits, activities undertaken, length of stay, value ascribed, alternative recreational activities). Add here co-creation activities / tools (see Annex)
		Stimulate/increase economic benefits	Reduced number of buildings affected by floods	Vulnerability /Economic damage cost	Data collection on number of houses affected by floods. The economic damage cost before the implementation of the NBS. Add here co-creation activities / tools (see Annex)

More specifically, for each sub-goal, the impacts of the NBS project should be identified that are to be monitored and evaluated by the indicators selected within step 3.2. Impacts are the effects/changes attributed to the NBS that are studied by the use of indicators (see step and reflect performance towards achievement of objectives or sub-goals). Note that impacts need to be identified at the appropriate spatial and temporal scales, as this will guide the design of the monitoring and evaluation plan.

There are two types of impacts:

- *"intended" impacts* are the effects/changes that are not only desirable but sought within NBS implementation.
- *"unintended" impacts* – they (usually) include negative, unforeseen effects/changes that occur after NBS implementation.

Step 2.2. Define the roles of stakeholders and their responsibilities

At this stage you should realize what stakeholders can be involved, how the project will benefit from their involvement and what particular tasks in this process can be subscribed to the certain group of stakeholders (see Table 4). As a repository of local knowledge, local stakeholders can be involved in order to monitor and evaluate the following aspects in regard to NBS (Arlati et al., 2021; EC, 2021; Frantzeskaki, 2019; IUCN, 2020; Morello et al., 2018; Zingraff-Hamed et al., 2020):

(1) the effectiveness of NBS (e.g. if the vision to the challenges fit) and the vision finding process;
(2) the suitability of the NBS design/design process to address the challenges;
(3) the suitability of the decision (and decision process) towards the challenges;
(4) how implemented NBS (and the whole process of its implementation) fit the vision;
(5) capability of the implemented NBS to address the challenges.

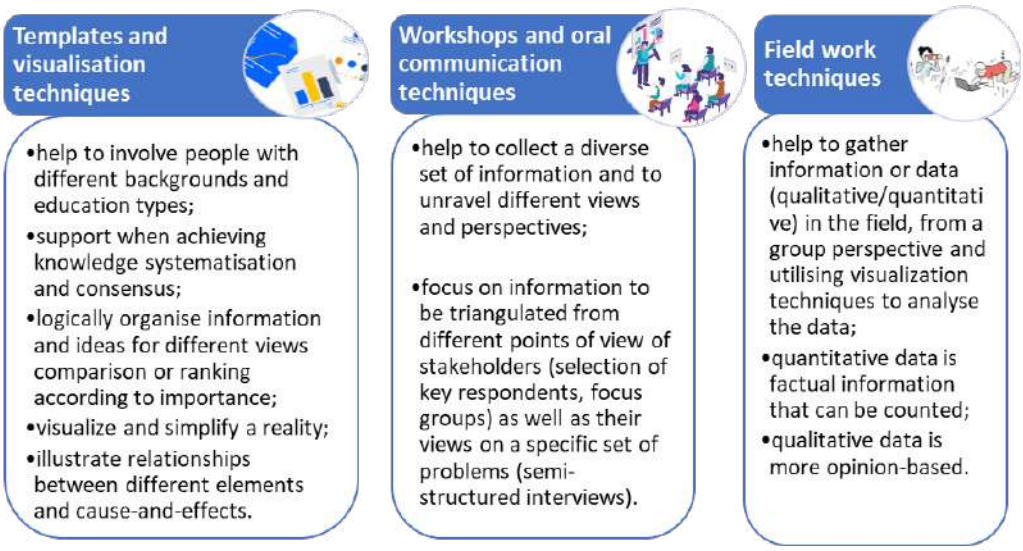
A set of approaches to mapping and involving stakeholders are presented in project deliverables (D1.2, D2.1, a new D1.9 – Manual for practitioners to co-creating NBS and in Dushkova and Kuhlicke, 2023).

Table 4 Main types of stakeholders and the reasons for their involvement in NBS co-creation process

Source: Dushkova and Kuhlicke, 2023

Stakeholder group	Reasons for its engagement	Type of innovation created and the role	Needs and requirements	Expectation from the NBS project
Academia & research (centres) (knowledge-based organizations)	Developing synergies Experimental data on the area of interest Collaborate in developing technical standards and guidelines	Technical innovation: - actor fundamental in knowledge production; - contributor to innovation thanks to crucial role that knowledge has gained in development processes	Exchange of scientific knowledge Knowledge transfer	New scientific knowledge on environment New knowledge on socio-economic issues and participatory methods Scientific publications Broaden networks Follow-up research grants
Public authority & political representation	National, EU and global environmental strategies / standards related to NBS Develop and enforce rules, laws and regulations Provide data, permits, authorizations, institutional support Owner and manager of area	Governance and organisational innovation: - support both industry and academia for the application of ideas to development through policies, strategies and initiatives; - cross-check that the new ideas create value for society	Opportunity to develop better policies and management intervention Performance-based evidences (co-benefits for social and political purposes)	Innovative solutions and guidelines to support environmental policies and management strategies Public awareness
Private sector organization	Strong actor who leads technological and organizational innovation; generates, produces and distributes products and services	Market innovation: - strong actor that leads technological and organizational innovation; - has the role of generating, producing and distributing products and services	Opportunity to co-finance NBS project and support in the promotion of NBS, making it marketable	New green business opportunities, shared ownership, access to better technologies as well as opportunities to influence research
Civil society organizations	Joint effort toward cooperation, dissemination and exploitation Foster participation, actions and promote participatory approach Collaborate in operationalizing NBS and provide support to data collection activities Provide publicity	Social innovation: - innovation users who provide knowledge about their needs, experiences and expectations; - directly affected by any changes made by NBS and thus can provide first-hand information on challenges & enablers	Enhancing the quality of the area and landscape Public awareness and citizen participation	Evidence-based data on the efficacy of the NBS project Citizen participation approaches for the protection of the area from the societal challenges that NBS is addressing New management practices for the local area
Media	Promoting NBS and disseminating results	Cross-sectoral innovation: - innovation users who promote the NBS and disseminate results	Awareness raising about NBS	Involvement in the actual real-life research and generating public interest

Once the stakeholders have been identified (within the step 1.3), it is time to specify the type of participatory/co-creation activity to be realized. Figure 4 summarizes different types of co-creation activities and their purpose.



Source: Dushkova and Kuhlicke, 2023

Figure 4 Types of co-creation activities and their purpose

Step 2.3. Review and finalize the program

Once the program is developed (it means, a series of actions are determined, all stakeholders along with the subscribed roles and responsibilities in certain actions are defined), a program, should be critically reviewed by the internal project team and also discussed with the partners. To review the program means:

a) to determine if it is meeting the stated objectives and outcomes;
b) to realize how the selected approach drives achievement (its effectiveness);
c) to evaluate the program curriculum, activities, etc. to determine what is working, what needs to be improved or added, and what needs to be changed in the program.

Based on the review outcomes, the programs should be adapted (e.g. its logic, scope, pathway) and finalized.

1.4 Step 3: Planning and designing

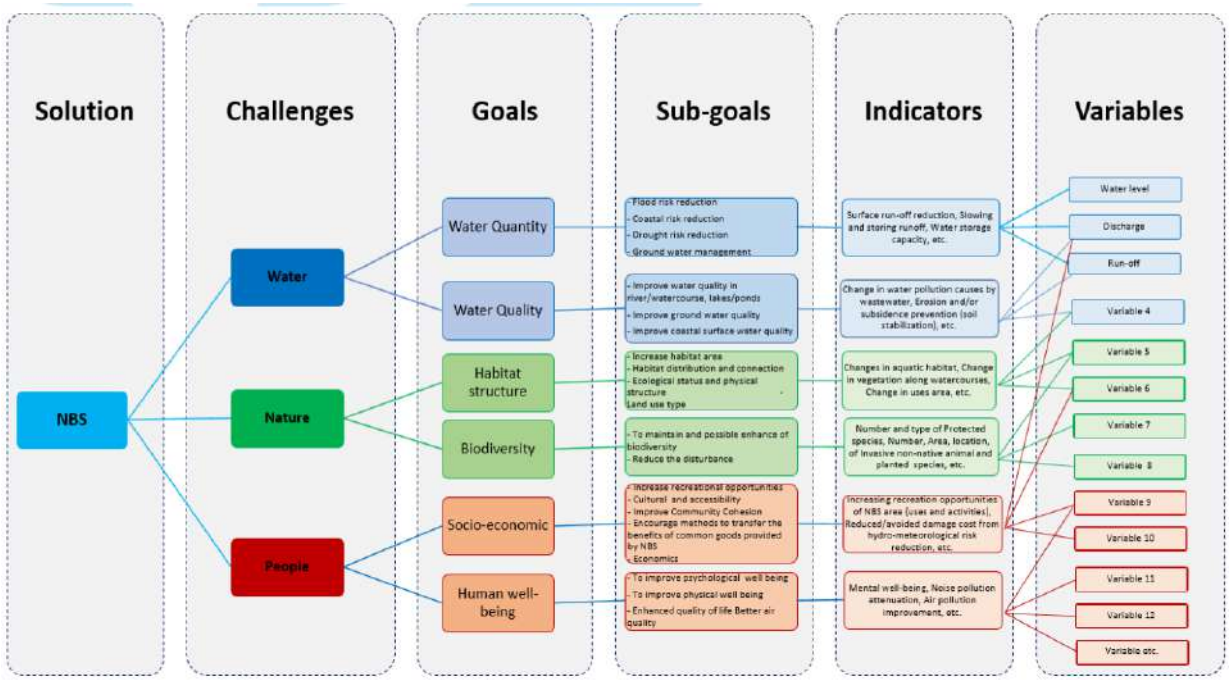
Step 3.1. Design/ specify the program: select data sources, methods, indicators and tools (see RECONECT Indicator selection tool and Toolbox for co-creation in Annex).

In defining the data sources, refer to your sequence of activities (see steps 2.1 and 2.3) to determine what resources you'll need to carry out those activities. Resources might include people, equipment and supplies, funding, information, or facilities. Take into account when resources will become available, and adjust the sequence of activities accordingly. In particular, this step includes investigation and determination of data sources that will be used to measure the indicators and will ensure that the data is accurate and reliable. Develop a data collection plan that includes the timing, frequency, and methods for collecting data. This plan should be reviewed and approved by relevant stakeholders.

Establish performance measures: just as you use the schedule baseline to measure whether a project is progressing on time, you'll need to establish other areas of project performance that you want to measure along the way. Decide how and when you will measure performance, such

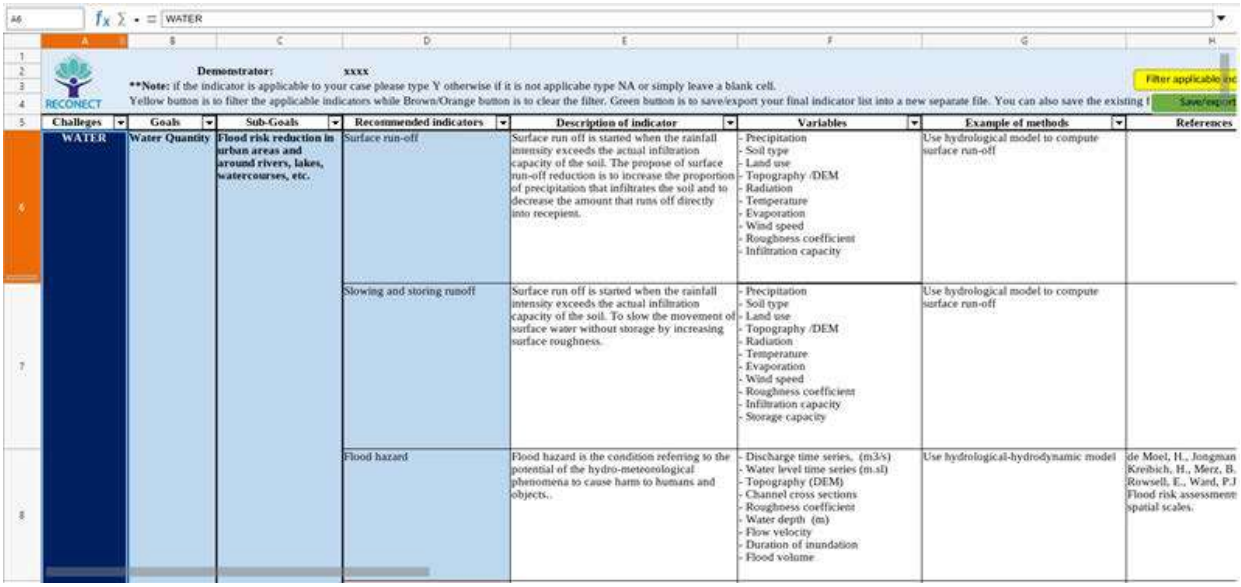
as holding meetings with team members and stakeholders to discuss the project or collecting their feedback through a questionnaire.

In regard to methods (e.g. ways or process in which the work will be performed/executed), you need to specify indicators that will be used to measure the expected outcomes. The "RECONECT Indicator Selection Tool" can be used to select suitable indicators per sub-goal (**step 3 of D2.6**). Use the tables below to outline the plan to monitor each indicator, identify and evaluate the impact and demonstrate whether the sub-goal is achieved (Table 5, Figure 5 and Figure 6). For more inspiration, you can refer to Calliari et al. (2019), EC (2021), Emerton (2017), GIZ, UNEP-WCMC and FEBA (2020), Raymond et al. (2017), Rödl and Arlati (2022), Sowińska and García (2021).



Source: RECONECT D2.6

Figure 5 RECONECT framework for development of indicators and variables



Demonstrator: xxxx

**Note: if the indicator is applicable to your case please type Y otherwise if it is not applicabe type NA or simply leave a blank cell.
Yellow button is to filter the applicable indicators while Brown/Orange button is to clear the filter. Green button is to save/export your final indicator list into a new separate file. You can also save the existing f

Challeges	Goals	Sub-Goals	Recommended indicators	Description of indicator	Variables	Example of methods	References
WATER	Water Quantity	Flood risk reduction in urban areas and around rivers, lakes, watercourses, etc.	Surface run-off	Surface run off is started when the rainfall intensity exceeds the actual infiltration capacity of the soil. The propose of surface run-off reduction is to increase the proportion of precipitation that infiltrates the soil and to decrease the amount that runs off directly into recepiens.	- Precipitation - Soil type - Land use - Topography /DEM - Radiation - Temperature - Evaporation - Wind speed - Roughness coefficient - Infiltration capacity	Use hydrological model to compute surface run-off	
			Slowing and storing runoff	Surface run off is started when the rainfall intensity exceeds the actual infiltration capacity of the soil. To slow the movement of surface water without storage by increasing surface roughness.	- Precipitation - Soil type - Land use - Topography /DEM - Radiation - Temperature - Evaporation - Wind speed - Roughness coefficient - Infiltration capacity - Storage capacity	Use hydrological model to compute surface run-off	
			Flood hazard	Flood hazard is the condition referring to the potential of the hydro-meteorological phenomena to cause harm to humans and objects..	- Discharge time series, (m3/s) - Water level time series (m.sl) - Topography (DEM) - Channel cross sections - Roughness coefficient - Water depth (m) - Flow velocity - Duration of inundation - Flood volume	Use hydrological-hydrodynamic model	de Moel, H., Jongman Kreibich, H., Merz, B. Rowsell, E., Ward, P.J Flood risk assessment spatial scales.

Source: The "RECONECT Indicator Selection Tool"

Figure 6 Illustration/screenshot of a Table from RECONECT Indicator selection Tool

Table 5 Plan for monitoring and evaluating the indicators in order to identify and assess the impact and demonstrate whether the sub-goal is achieved

Source: RECONECT Indicator Selection Tool

Sub-goal	Impacts	Indicators*	Question addressed by the indicator	Monitoring (for each indicator)		Evaluation (for each indicator)
				Preliminary procedure	**Data sampling**	
Name the sub-goal	Name the impacts for this sub-goal that are going to be monitored by the indicators. Define if it is Intended (I) or unintended (U) impact (see step 2.1)	List the indicators that you use to monitor the impact in this sub-goal	Write down the question that is answered by the indicator	Fill in the following information for each model and/or for each data you require to assess the indicator** for the situation after NBS implementation:		- explain how you plan to compare the monitored values and reference/baseline values to assess the impact; - after you compared the monitored indicator value(s) to the reference / baseline value(s) and observed a change, interpret how the sub-goal is being achieved; - define the time scale over which the indicators should show that the sub-goal has been achieved or not - provide to which stakeholders evaluation needs to be presented; - define how often and for how long will the evaluation be carried out?
				- If applicable, write the type of model needed for this indicator; - explain the purpose of using this model for this indicator; - specify availability of the model ("Already available" / "Not available yet") - define the type of data ("qualitative" or "quantitative") required to assess the indicator after NBS implementation - specify the spatial sampling/spatial coverage (where data are collected)	- explain how often the data are collected/frequency; - specify the period of data collection (year/ month, start-end); - specify the name of the organizations responsible for the data collection	

**Note*: use the indicators in the "RECONECT Indicator Selection Tool" in relation to this sub-goal. If the "RECONECT Indicator Selection Tool" does not contained your desired indicator, then define an indicator yourself. Write a short paragraph explaining why this indicator is needed.

***Note*: Please select the value of the indicator for the reference/baseline reference/baseline used from these choices: A – before implementation in the NBS area; B – before and after implementation in a control area; C – a specified reference value.

Below, you can find some examples of indicators to be used for measuring the impact/expected outcomes resulted from NBS:

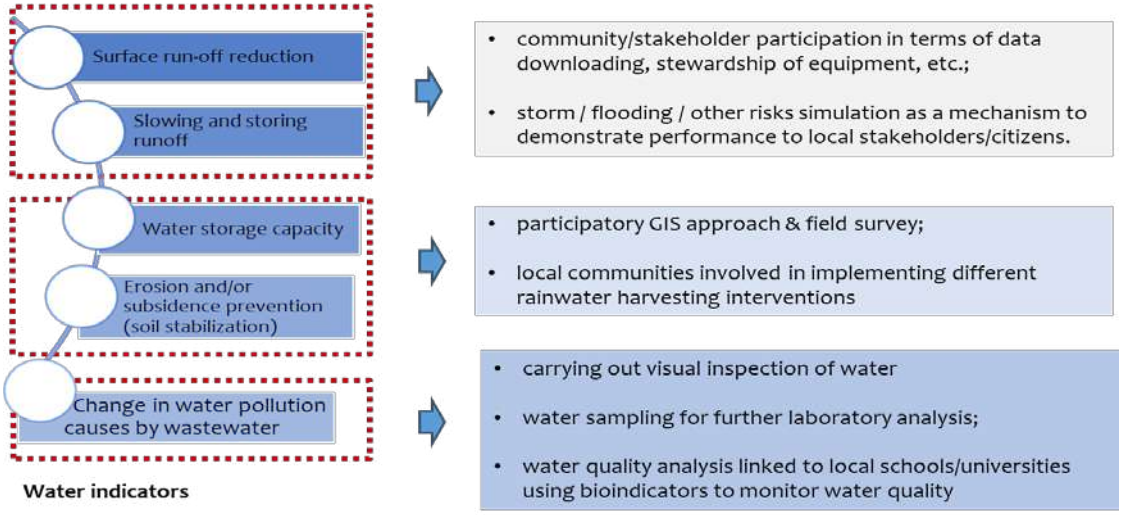
- For example, the performance monitoring of a retention pond may be in relation to three sub-goals, i.e. "Flood risk reduction" (WATER), "Increase habitat area" (NATURE), and "Increase in recreational opportunities" (PEOPLE). In relation to the achievement of sub-goal "Flood risk reduction" (WATER), NBS intended impacts include the reduction of flood hazard and of economic vulnerability. The selected indicators to monitor these impacts could include "flood hazard" (WATER) and vulnerability indicators such as "economic damage cost" (PEOPLE), respectively.
- In relation to the achievement of sub-goal "Increase habitat area" (NATURE), an NBS intended impact may be the increase of the habitat size for the species which may be monitored using the indicator "aquatic habitat area" (NATURE). On the other hand, an increase of sedimentation in the pond (unintended impact) may result in the reduction of the aquatic habitat area, hence affecting the achievement of the sub-goal. In this case, a suitable indicator to monitor such impact could be the sedimentation indicator "bed level change" (WATER).

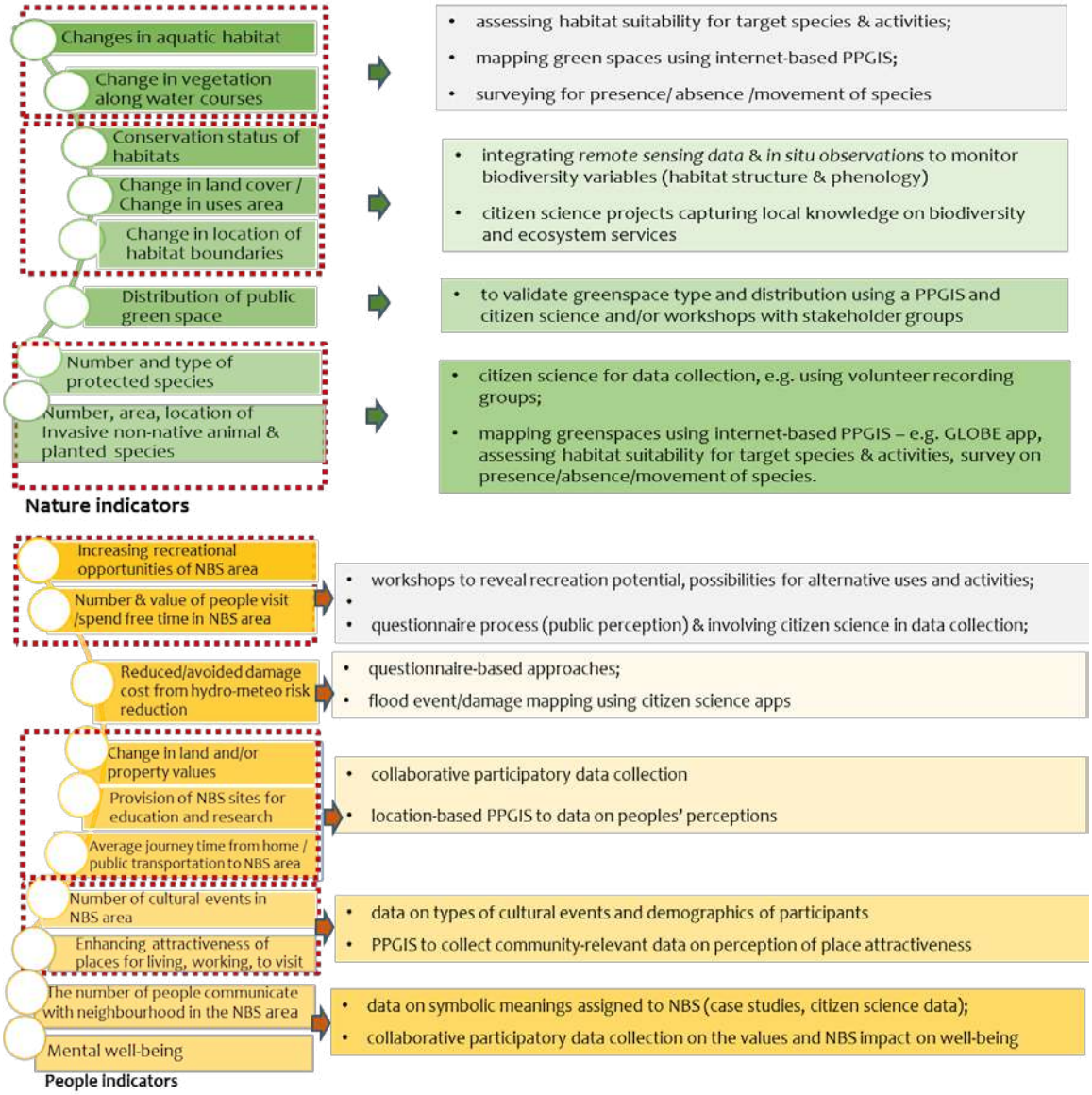
- Finally, intended impacts of the NBS affecting the performance towards achievement of sub-goal “Increase recreational opportunities” (PEOPLE) may include the increase of green areas and the NBS attractiveness for recreational purposes. The former could be monitored by the indicator “green area size” (NATURE) whereas the latter, by indicators related to the number of people that visit or spend time in the NBS area as well as the purpose of those visits (PEOPLE).

As shown above, note that the selected indicators may belong to a challenge area that is different from the one of the sub-goals.

Within this step, also data/model required to assess the indicator should be identified **(steps 4-5 of D2.6)** in order to prepare a sound monitoring campaign for data collection, and collect the data. For this purpose, the “RECONECT indicator assessment methodologies” for WATER, NATURE, and PEOPLE were developed and contain, amongst others, the data that can be used as input for indicator assessment. A sound monitoring campaign is of high importance because, if from the data analysis there appears to be no evidence that an impact has occurred, there is the risk that an impact did occur but has remained undetected. There are methods that can be used to choose monitoring campaigns that have the potential to detect a particular impact (e.g. power analysis methods for NATURE sub-goals).

There is a number of approaches for involving participatory process in monitoring and evaluation of NBS impact (Figure 7). Particular tools and their description can be found in Annex.





Source: authors

Figure 7 Examples of how participatory approach can be used for monitoring and evaluation of NBS impact

In order to select the most appropriate tool for co-monitoring and co-evaluation, we developed a decision-making Matrix in form of a comparative chart of all tools described in the manual (Table 5). For more details, see Manual for practitioners D1.9. The choice of tools presented in Matrix (Table 5) depends on the answers provided to the following issues, more specifically:

1) to the main goal of the co-creation process – see *column 4 of Table 5* (in regard to this context, it can be stakeholder identification and analysis, or monitoring and evaluation of NBS impact, or establish partnership, etc.) – it is closely related to the sub-clusters provided in the *column 1 of Table 5*;
2) to the format/type of activity (see step 2.1 and Figure 7) – see *column 5 of Table 5;*
3) to the assessing of resources and capacities for co-creation, e.g. the materials, time, skills (effort), costs and other requirements needed to apply the particular tool (see Step 1.2 and *columns 7-11 of Table 5* / Matrix of tools)

4) on the type of actors involved (see Step 1.3 and *column 12 of Table 5*) and the level of co-creation (see Step 1.3 and *column 12 of Table 5*).

Here we provide an examples of tool selection procedure:

1) My goal of co-creation is “stakeholders’ identification and analysis”, so by looking at the respective column “Main goal of co-creation process”, readers see what of the tools from this column refer to sub-cluster “Tools to engage stakeholders” and should now select from this number of tools marked with “x” (e.g. “Actor/stakeholder mapping”, “Who inspires us”, “Stakeholder visualization”, “People connection map”, “People shadowing”, etc.).

2) Now readers need to select those tool(s) which are in line with the format of my planned activities, so readers are asked to look at the column “Format / Type of activity”: if readers want to organize workshop, only tools identified in this column with “W” (workshops) will be suitable (e.g. “Who inspires us”, “Future search conference”). But if it is enough to simply visualize the results, readers should select tools marked as “T” (templates) – e.g. “Stakeholders CV tool”, “Stakeholder visualization”.
3) After that readers need to decide on the level of co-creation: if it will be enough to have a consultation (2nd level), readers can select “Stakeholders CV tool”, but if the level 4 is needed (empowering), readers need to apply “Who inspires us” or “Future search conference”.

4) When reflecting on the resources, readers have for the certain activities, it is important to select the right tool in regard to group size (e.g. “Stakeholders CV tool” is required for the small number of stakeholders group marked as “1” while “Future search conference” is suggested for a larger group defined as “3”). In regard to the timeframe, both “Stakeholders CV tool” and “Future search conference” are very time consuming (defined with “3”) while “Who inspires us” requires less time to organize the activity based on this tool (marked as “3”). When planning the budget, the respective column helps to identify that “Future search conference” will require high costs (marked as “ $ $ $ ”) in comparison to “Stakeholders CV tool” or “Stakeholder visualization” (defined as “ $ ”).

5) Two last things need to be clarified for the final selection – in case the tool requires a low level of expertise, readers should take without doubt a “Stakeholder visualization” tool (defined as “1”) while for “Future search conference” (“3”) an additional training will be needed. The same is with the level of facilitation.

6) When deciding about the groups of stakeholders which can be involved in the activity, readers need to check the last column “Actors involved” where it is clear that for instance “Stakeholders CV tool” is rather for academia and research centres while “Future search conference” can be applied for all groups of stakeholders.

The information on how to apply each of the tools of Matrix (Table 5) is provided in form of Factsheets in Annex of this deliverable. Some of the tools can be applied only for co-creation process with very specific groups of stakeholders, other tools may help to better identify the needs and capacities of the stakeholders to enable better collaboration.

Table 6 Decision-making matrix to identify relevant tools for co-monitoring and co-evaluation

Sub-cluster (relates to figure 8)	Tool	Step 0: Suitability for NBS stage				Step 1: Main goal of co-creation process / purposes of tool application								Step 2: Format / Type of activiy	Step 3: Level of co-creation	Relates to Step 2: Resources and capacities for co-creation					
																Group size / N parti-cipants	Timeframe	Budget / Cost	Level of expertise /effort	Facilitati-on level	Actors /Stakeholders involved
		co-assessment and planning	co-design	co-implementation	co-monitoring/co-evaluation	Exploring local context & dynamics	Stakeholder identification & analysis	Develop new visions and ways of problem framing/strategies	Data gathering to find concrete	Decision-making support	Monitoring and evaluation of NBS	Establish partnerships, foster cooperation	Stimulate learning among actors	W: Workshop& communication	1. Infor-mation	1. Small (1-5 people)	1. Less (30-60 min)	$ - Inex-pensive	1. Easy/ Low	1. Begin-ner	1. Academia & research centres
														T: Template & visualization	2. Consul-tation	2. Middle(6-12 people)	2. Middle (<1,5&1-2 h)	$$ - Mode-rate	2. Middle	2. Medi-um	2. Private sector organizations
														F: Fieldwork techniques	3. Collabo-ration	3. Large (13-100+ people)	3. High (>3,5 h)	$$$ - Expen-sive	3. High (trained personal)	3. Advan-ced	3. Public aut-hority&polititians
															4. Empo-wering						4. Civil society organizations
Tools to engage stakeholders	2.1. User personas	x	x			x		x	x	x	x			T	2+3	2	1	$	2	Medium	2+3+4
	2.2. Actor/stakeholder mapping	x	x			x	x					x		T	3	1-3	2-3	$	2	Advanced	all
	2.3. Stakeholder CV tool	x	x				x					x		T	2	1	3	$	2	Advanced	1
	2.4. Stakeholder visualization	x	x			x	x	x				x		T	2+3	1	1-2	$	1	Beginner	all
	2.5. People shadowing	x	x			x	x	x	x		x			T+F	2	1	3	$$	3	Medium	2+3+4
	2.6. People&connections map	x	x			x	x					x		T	3	1-2	1	$	2	Beginner	all
	2.7. Expert interview	x	x			x		x	x	x		x	x	W	2	1	1-2	$	2	Medium	1+3
	2.8. Team canvas	x	x									x	x	T+W	3	2	2	$	2	Medium	1
	2.9. Service blueprint	x	x	x		x	x		x	x	x	x		T+W	3	1-3	2	$	1	Medium	all
	2.10. Skill share	x	x		x		x	x				x	x	T+W	3	1	1	$	1	Beginner	all
	2.11. Who inspire us?	x	x			x	x	x				x	x	W	3+4	2	1	$	1	Medium	all
	2.12. Building partnership map	x	x			x	x	x				x	x	T	3	2-3	3	$$	2	Advanced	all
	2.13. World café	x	x		x			x		x		x	x	W	2+3+4	3	2	$$$	2	Medium	all
	2.14. Focus	x	x	x	x	x		x	x	x	x	x		W	2+3	1-2	3	$$	2	Medium	all
	2.15. Sketch mapping	x	x	x	x	x		x	x	x				W	2	2	2-3	$	2	Beginner	all
	2.16. Future Search Conference	x	x			x	x	x		x		x	x	W	3+4	3	3	$$$	3	Advanced	all
Tools to test and validate the developed NBS	5.1. Prototoype testing plan		x	x	x	x		x	x	x	x			T+W	3	1-2	2	$	2	Medium	all
	5.2. Live prototyping		x	x	x	x		x		x	x		x	T	2+3	3	3	$$$	3	Medium	all
	5.3. Usability testing		x	x	x	x		x	x	x	x	x		T+W	3	1	3	$	3	Advanced	all
	5.4. Assumption mapper	x	x	x	x			x	x	x			x	T+W	3	1-2	2	$	2	Medium	all
	5.5. Blink testing / 5 sec testing	x	x	x	x	x		x		x	x			W	2	3	1	$	1	Beginner	all
	5.6. A/B tests	x		x	x			x	x	x	x			T	2	3	1	$	1	Beginner	all
	5.7. Storyboarding / story wall	x	x	x	x			x			x	x	x	W+T	3	1-3	2	$	1	Beginner	all
	Story-world (tool 3.13)	x	x		x	x		x	x		x		x	W+T	2+3	2	2	$	2	Medium	all
	5.8. Learning loop	x	x	x	x			x		x			x	T	3	1-2	1	$	1	Begginer	all
	5.9. Improvement triggers	x	x	x	x			x	x				x	T	3	1-2	1	$	1	Begginer	all
	Service blueprint (tool 2.9)	x	x	x		x	x		x	x	x	x		T+W	3	1-3	2	$	1	Medium	all
Tools to support decision and evaluate the user's reaction to the NBS	6.1. Open Nature Innovation Arena (Co-creation Arena)	x	x			x		x	x		x	x		T+W	3+4	1	1	$$$	2	Medium	all
	6.2. I like - I Wish - What if	x	x	x	x			x	x	x	x	x	x	W	3	2-3	2	$	2	Medium	all
	6.3. Dotmocracy	x	x	x	x	x		x	x	x		x		W	2+3	1-3	1	$$	1	Beginner	all
	6.4. Heuristic evaluation		x		x			x		x	x		x	W	3	1-3	3	$$	3	Advanced	all
	6.5. Logic model		x		x				x	x	x			T	3	1	1-2	$	2	Medium	1 (internal team)
	6.6. Transformative impact	x	x	x	x	x		x		x	x		x	W	3	2	2	$	2	Medium	all
	6.7. Critical task list	x			x				x	x	x			T	1	1	1	$	1	Beginner	1 (internal team)
	6.8. Scaling plan		x	x		x		x	x	x		x		W	3	1-3	3	$$	3	Advanced	all
	6.9. Scoring and rating	x	x					x		x		x		T+W	2	2-3	2-3	$	3	Advanced	all
	6.10. Delphi survey / method / techniques	x			x	x		x	x	x			x	W	2	2	3	$$	2	Medium	all
	6.11. Multi-criteria decision analysis	x			x				x	x	x			T	2	1	2	$	2	Medium	all
	Multiple Perspective Wheel (tool 3.11)	x	x		x	x		x	x				x	W	3	1-2	1	$	2	Medium	all
	6.12. Prioritizing and ranking	x	x	x	x			x	x	x				W	2	1-2	1-2	$	1	Beginner	all
Tools to monitor and evaluate the NBS impact	Social mapping (tool 1.14)	x	x	x	x	x	x					x	x	W	3	2-3	2	$	2	Medium	all
	Focus s (tool 2.13)	x	x	x	x	x		x	x	x	x	x		W	2+3	1-2	3	$$	2	Medium	all
	7.1. Logical framework analysis	x	x	x	x			x	x	x	x			T+W	2	3	2	$	2	Advanced	1 (internal team)
	7.2. Beneficiary assessment	x	x		x	x		x	x	x	x	x		F+W	2	3	3	$$$	3	Advanced	all
	7.3. Define your indicators	x	x	x	x				x	x	x			W+T	2	1-2	2	$$	3	Advanced	1 (internal team)
	7.4. Participant observation	x	x	x	x	x	x	x	x	x	x			F	2	2-3	3	$$$	1	Beginner	all
	Participatory mapping (tool 1.12)	x			x	x		x	x	x	x		x	T+F	2+3	1-2	3	$	1	Beginner	all
	7.5. PPGIS (Public particip. GIS)	x	x	x	x	x		x		x	x	x	x	T+F+W	3+4	1-2	3	$$$	2-3	Medium	all
	Transect walk (tool 1.8)	x		x	x	x		x	x	x	x			F	2+3	2-3	2	$$	1	Medium	all
	Field trips (tool 1.10)	x	x	x		x	x	x	x	x	x		x	F	2+3	1-2	3	$$$	2	Medium	all
	Ethnographic fieldnotes (tool 1.11)	x	x	x	x	x		x		x	x			F	2	1	2	$	2	Beginner	1+4
	Auto-photography (tool 1.9)	x	x	x	x	x		x	x	x	x	x		F	1	1-2	2	$$	2	Medium	all
	Fuzzy cognitive maps (tool 1.13)	x	x	x	x	x		x	x	x	x	x		T	3	1-2	3	$$	2	Medium	all
	7.6. Scenario comparison (before/after)	x	x	x				x	x	x				T	2	1	2	$$	2	Medium	1 (internal team)

Step 3.2. Specify the program: develop a measurement plan (schedule)

At this stage you develop a schedule management plan to determine the start and end dates of a certain project action/activity, the milestones along the way of its achieving, and a timeline for completing individual tasks (you can further use and extend Table 4 provided in the step 3.1 by adding the columns “individual tasks for each stakeholder/name”, “time required to complete the tasks”, “potential risks and change control”, etc. – see below under main tasks). In other words, at this stage, a data collection plan should be developed that includes the timing, frequency, and methods for collecting data **(step 6 of D.2.6).** This plan should be reviewed and approved by relevant stakeholders.

Recognition of key NBS project activities that will contribute to achieving the objectives or sub-goals should be done earlier, within the step 2.1. These activities should align with the goals and sub-goals and will be used to measure the performance of the NBS project.

The main tasks to create a schedule plan are provided below:

- define the start of project’s co-monitoring and co-evaluation activities and their duration;
- account for the individual tasks for each activity and the time required to complete them;
- order the activities in the most logical sequence so that the process can be tracked and managed;
- establish the schedule baseline that project stakeholders approve once all tasks, timelines, and resources have been accounted for (having a schedule baseline provides the team with a tool for gauging whether the project stays on schedule; when a task or activity takes longer than is expected, project managers and teams can refer to the schedule baseline to determine how best to get a project back on track;
- create contingency plans (it is important since with most projects, some delays and challenges can impede progress, for example, resources crucial to a particular activity may become unavailable, thus resulting in a delay or even an added cost);
- document potential risks as well as contingency plans, or Plan B, for how the team will handle instances when potential risks become a reality;
- identify schedule change control procedures where you will document instances when specific schedule elements can be changed and by whom; here you should also include details about the impact of specific schedule changes on the project, including the time to completion, the need for additional resources, or changes to actual tasks and activities.

Step 3.3. Control and report

This includes establishing of the format and frequency of progress reporting. At this stage, you will document how team members should submit updates on the project. Include details such as:

- who will submit progress reports;
- how often they should submit reports;
- required information for the reports;
- the format for these reports (visual representations or written descriptions);
- where the reports are submitted;
- how and when to communicate with the stakeholders to share the results (communications management plan).

The last point (a communications management plan) is a useful tool which can later help during the last step 5.3. It ideally should include the following nine parts:

1) *sender, receiver and a message* – define who in your team will be responsible for communication with certain stakeholders (there can be different contact people for different stakeholders);
2) *content* – your main message should always be expressed in an easy to understand format and language, it should be edited and proof read if necessary;
3) *way to convey a message/ communication channels* – select the most suitable option in regard to your current goal and situation: phone conversations, team meetings, presentation during the local workshops/festivals, newsletters, magazines or e-magazines, letters to staff, press releases, annual or progress reports, emails and intranets, web portals, focus groups, consultation meetings, face to face, formal or informal meetings with stakeholders, social media;
4) *stakeholder communication requirements* (communication strategy) – should be detailed in the communications plan, but include the following details: sender and receiver, content, method of delivery, frequency, timing, reason for communication
5) *reason for communication* – expressing that need within the plan often addresses the core issues that can guide future decision making and ensure the communications plan is effective in carrying out its purpose;
6) *frequency and timing* of stakeholder communication – if the communication is performed one week before the transaction the stakeholder will be offended and the project will be jeopardized
7) *resources* – include people (the manpower required to produce the communications), materials (e.g. items which are used up in the production, such as paper); tools and equipment (e.g. items which are required to produce the communications and returned in the same condition, such as a printer); facilities (e.g. the buildings/conference hall which must be leased, purchased, or rented to house the people and equipment to produce the communications), I.T. Systems (e.g. the project management information systems that facilitate and track the communications); budget required to realize the communication process;
8) *confidential Information* – the communication plan should also identify any confidential information and the strategy to keep that information confidential;
9) *constraints* – e.g. legislative constraints that impact the project (so, investor communications should not contain sensitive insider information while project team communications are governed by a host of union, safety, and labour legislation; additionally, there might be constraints to giving certain information to external parties due to organizational policies or potential legal action rather than government legislation).

1.5 Step 4: Implementing

This step provides information on the main aspects to be considered when carrying out co-monitoring and co-evaluation activities.

Step 4.1. Implement activities and collect data **(step 7 of D2.6)**

After selecting the methods, measures and tools, familiarise yourself with the tool description (see Annex of this deliverable), follow the instructions on how you can apply the tool and finally launch innovation partnerships. Next, you assemble the network of actors/stakeholders for the process of co-creation where you already recognized their roles and responsibilities (step 2.2). Only then you can start the practical implementation of data-collection activities within co-monitoring and co-evaluation identified within step 3.2 by:

- ✓ ensuring that the implementation proceeds according to the plan;

- ✓ checking that you are able to tolerate uncertainty and are prepared for changes;
- ✓ considering that the only way to learn which method or tool works the best in various situations and between various actors is by testing.

Applying the participatory approach to monitoring and evaluation helps to evaluate the impact of implemented NBS and monitor the durability and quality of the interventions together with different groups of stakeholders. It will enable to assess the impact of the NBS interventions and success or failure of the processes.

Local platforms can be used to collect data to evaluate the implementation progress from a local NBS development perspective. This phase must be considered as a co-creation activity in all effects because it requires a strong involvement of stakeholders and here is where you measure the success of all the process. A crucial moment of the pathway, indeed, where a strong effort to sustain all the process is required. It also refers to exploring and finding solutions for replicating successful stories on NBS. Involved stakeholders should be the promoters for replication and further development of the implemented solutions. Solutions are both tangible products and innovative procedures to diffuse the application of NBS in cities and regions. It consists of the following steps:

- Validate NBSs in place
- Verify co-benefits of NBSs in place
- Sustain action for replication
- Co-develop the action

Co-evaluation facilitates understanding changes to mobility patterns and behaviours within neighbourhoods and the way in which they happen. It deals with impacts (what/how much has changed) and processes (what has led to that change – what has been done, what barriers and drivers affected the process and so on). As the prefix ‘co-’ implies, co-evaluation is performed jointly, in a way which is inclusive of the stakeholders participating in co-creation.

The participatory methodologies that will guide co-monitoring and co-evaluation plan include a number of tools such as citizen science, monitoring indicators using a set of apps, tracking policy and planning processes, and the use of web-based tools to support the process. Below you can see the tools suggested for this purpose (Factsheets with description on how to apply the tools can be found in Annex):

- Logical framework analysis
- Focus group discussions
- Social mapping
- PPGIS
- Geoquestionnaire
- Logical framework analysis
- Beneficiary assessment
- Participant observation
- Transect walk
- Scenario planning
- Participatory mapping
- Scenario comparison (before/after)
- Auto-Photography / participatory photographs
- Field trips
- Ethnographic fieldnotes

Step 4.2. Analyse data, assess and identify the outcomes

Data analysis aims to determine if the expected outcomes have been achieved and if the NBS project is on track to meet its goal or sub-goals **(step 8 of D2.6).** For this purpose, use the indicators listed and explained in detail in the evaluation and statistical analysis to assess the impacts of the NBS project on each of the sub-goals. As for each indicator, it was specified in advance what a change in the indicator value would consist of in order to be interpreted as a success, and what the time scale of an expected effect would be progress towards achieving the sub-goals can be assessed by comparing the monitored values with the reference or baseline values of the indicators. It should be noted that not always concrete target values can be set for all indicators, hence, it should be considered whether changes of the indicator value in the targeted direction can be interpreted as success.

According to approach provided in D2.6, assess the indicator for the reference/baseline situation. Use the methodology provided for each group of indicators:

- RECONECT methodology for indicator assessment – WATER
- RECONECT methodology for indicator assessment – NATURE
- RECONECT methodology for indicator assessment – PEOPLE

Summarizing these methodologies, the value of the indicator for the reference/baseline situation is used for comparison with the value of the indicator after NBS implementation, to demonstrate that the sub-goal is being achieved. Values of the indicator for the reference/baseline situation include i) the value of the indicator before implementation of the NBS, ii) a pre-defined value, for example by regulation, and iii) the value of the indicator before and after implementation of the NBS in a control area (area with similar environmental conditions to accommodate for other changes in the indicator value unrelated to the presence of the NBS). For certain impact assessments of large-scale NBS such as those in the NATURE domain, finding a suitable control area is challenging. Ideally, the control area should have similar environmental conditions as the impact area, but be far away enough to be unaffected by the NBS intervention. However, finding such a suitable control area may not be possible. In that case, an alternative approach may be to predict what the situation would be in the project area without implementation of the NBS. This would become the reference/baseline situation to which to compare post-NBS monitoring data and assess impact.

Finally, assess impact/change, and related uncertainties, by comparing the value of the monitored indicator after NBS implementation to the one in the reference/baseline situation.

This step requires a strong involvement of stakeholders who can support by measuring the success of all the process. A crucial moment of the pathway, indeed, where a strong effort to sustain all the process is required. This step requires original solutions, cohesion and constancy. Diverse stakeholders (especially, the end-users/beneficiaries of the NBS) will contribute to assess the impact of the interventions and success or failure of processes. Citizen science approach can be used to collect data to monitor and evaluate the implementation progress of NBS development (but also other tools suggested within the *Step 4.1*). It is also important within this step to reflect on co-monitoring and co-evaluation of co-creation process and its activities.

Step 4.3. Interpret and visualize the results

Now that you have your results, you need to interpret them and come up with the best courses of action based on your findings. Data visualization additionally helps to graphically show your information in a way that people can read and understand it. For this purpose, you can use charts, graphs, maps, bullet points, or a host of other methods. Visualization helps you derive valuable insights by helping you compare datasets and observe relationships. When we look at

interpreting evaluation results, there are a number of things we need to consider but the first thing we absolutely must consider is whether scores are falling into an expected area or not.

There is a number of participatory tools to be involved within this step (see Annex, Factsheets of Sub-cluster: Tools to test and validate NBS):

- Prototype testing plan
- Live prototyping
- Usability testing
- Assumption mapper / mapping
- Blink testing / 5 seconds-blink testing
- A/B tests
- Story boarding / story wall
- Learning loop
- Improvement triggers

1.6 Step 5: Utilizing

Step 5.1. Review plan, process and outcomes

Once the activities within the co-monitoring and co-evaluation are started, you have to think about the utilization of their results and experiences. Here, it is important ensure that all the stakeholders involved in the process benefit. Consider the principles provided in Table 1 of the step 0.2. At this step, an open attitude and learning through experiments are the surest means of producing benefits. Ensure an open, trusting, pro-development, encouraging and creative atmosphere.

Process evaluation of measures is carried out to identify the drivers and barriers in the implementation process and their effects on the success (or failure) of the process. It also provides an account of the 'drivers' (motivations, external factors, issues driving the measure forward) and 'barriers' (problems and deviations from the plan) during the measure planning, implementation and operational phases. Process evaluation helps to provide answers to questions such as:

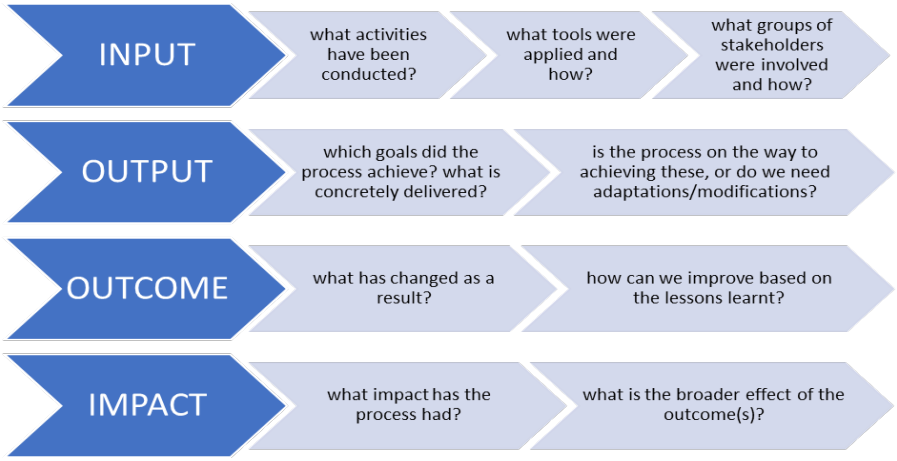
- in what way was the problem/activity/situation dealt with?
- what went well/wrong and why?
- who did or should have done what?
- how was the process perceived by key stakeholders?

Step 5.2. Reflect and report on lessons learned

By definition, co-creation process as well as its parts related to co-monitoring and co-evaluation represent an open process which evolves over time as learning progress. Each co-creation process 'goes with the flow' of the participants' ideas and needs (Hölscher et al., 2020). This requires continuous monitoring, reflexivity and evaluation. Reflexivity helps to identify lessons learned and to adapt the process in light of changing objectives. Therefore, those involved in co-creation should ask a lot of questions of the process along the way, for instance:

- which goals does the process aim to achieve?
- is the process on the way to achieving these, or do we need adaptations/modifications?
- how can we improve based on the lessons learnt?
- what impact has the process had?

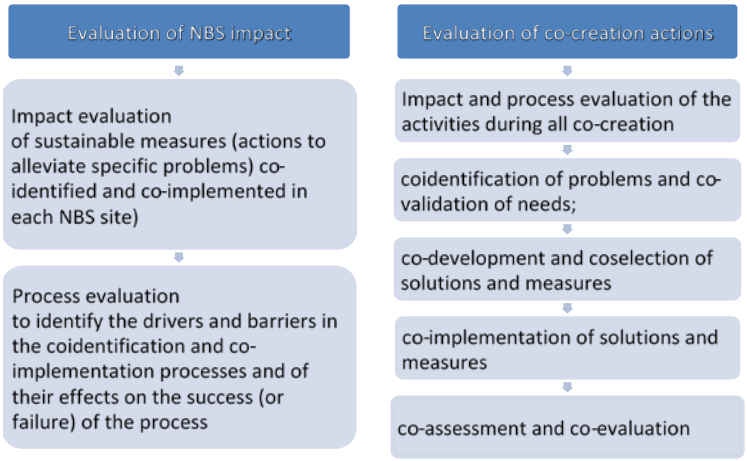
There are several methods to achieve this reflexivity and support by answering the above questions, e.g. reflexive monitoring in action (Lodder et. al., 2020), or to compare the situation before and after. Another option is to conduct a short survey using a template provided earlier in Section 1 of this deliverable. Therefore, those involved in co-creation (incl. co-monitoring and co-evaluation) should ask a number of questions of the process along the way (Figure 8).



Source: Dushkova and Kuhlicke, 2023

Figure 8 RECONECT approach to evaluate the impact of co-creation

In regard to a more participatory approach to evaluation, not only a step-wise framework/approach but also the specific tools have to be developed, considering the scale, the macro sectors of interest, and the implementation time (since reliable assessment should be provided within the project duration). Also, the participatory approach should be applied which means that a number of stakeholders will be involved in the data collection and analysis/discussion in order to develop a common positive consciousness of the benefits related to NBS. As mentioned by many NBS related projects (EC, 2021), along with systematic observation and recording of current and changing conditions, the collected data should then be evaluated to assess the obtained benefits at the selected scale. We suggest to use a combined approach to co-evaluation (Figure 9).



Source: authors

Figure 9 RECONECT approach to co-monitoring and co-evaluation of NBS impact and the whole co-creation process

Step 5.3. Communicate: share & discuss the results **(step 9 of D2.6)**

To be useful, information acquired through co-monitoring and co-evaluation needs to be communicated to different stakeholders. Many projects have seen their success erode merely due to poor communication itself. Already during step 3 it should be specified how information should be communicated (step 3.1), when and to whom (step 3.3). This step 5.3 includes communication of results of the co-monitoring and evaluation to relevant stakeholders and use of the information to make decisions about the continuation or adjustment of the NBS project. A final report is the most important way to communicate an evaluation. Other formats to consider include short communications such as brochures or newsletters, publications in scientific journals, local papers and social media, verbal presentations at debriefing meetings, local workshops and several creative formats (Table 6).

Table 7 Example of tools to be used for communication, sharing and discussing the results on NBS evaluation with stakeholders

Source: authors

Tools for communication of results	**Purpose**
A final report	• As a long and solid communication format, it is the most important way to communicate the results of co-evaluation of NBS impact.
Publications in scientific journals	• As academic dissemination format, such publication of results is available (mostly) for experts, scientists, practitioners with a solid scientific/technical background

Brochures, bulletins/briefs, newsletters	• As a short communication formats can be used to highlight particular findings or angles on the evaluation.
	  • Bulletin offers a very short format – either a frequently-circulated update on project progress or a short presentation of evaluation results. It can also be used to present changes decided - for example in a “policy brief” or a bulletin summarising “lessons learned”.
	  • Newsletter is longer than the other types and generally follows a newspaper format, having a regular theme and at regular intervals. This can include articles about evaluation findings and more analytical themes.
	  • Brochure: Simple folded leaflet or pamphlet used to attract attention to your organization, usually for PR purposes. You can highlight a particular positive impact statement from an evaluation in a brochure, for example.

Local and regional newspapers and magazines	• It is an easy, accessible way to start creating local news and strengthen local dialogue
Social media / Community Journalism	• Engaging local communities to create and distribute their own news and set up local dialogues. • Sharing local stories contributes to strengthening the local community and could support local democracy. • Could be used as agenda-setting tools (issues connected to the NBS and the neighbourhood), especially on the long-term effects of the NBS become apparent. • By keeping the story running, local feel more connected to the project. Hence it could increase support and social acceptance of the NBS. • Positive effect for learning community, might increase participation.
Blog	• The “weblog” is more of an informal discussion piece that can probe more deeply into analysis of a particular question or finding from the evaluations – for example as part of a series of “Stories from the field” or a project-related blog.
Debriefing meeting	This form of verbal presentations of evaluation’s results typically goes over open action items related to a specific project or event, any kinds of challenges that have come up, personal learnings and factual information, related progress, or next steps.
Creative local workshops	Help to validate the NBS

World-café	It is a simple, effective, and flexible format for hosting large group dialogue. It helps to create your innovative large group experience to stimulate insight, imagination, motivation and collective action
Focus group	It helps to collect opinions and feedback from a group of stakeholders about specific features of NBS, to discuss their opinions, thoughts, and feelings in a facilitated discussion.
Geoquestionnaire, PPGIS	They involve an integration of sketchable maps with questions, aimed at eliciting public preferences and attitudes towards NBS.
Creative formats (for more details, please see Annex with Factsheets of each of the tools provided here as examples)	• Usability testing • Assumption mapper / mapping • Blink testing / 5 seconds-blink testing • A/B tests • Story boarding / story wall • Learning loop • Improvement triggers • Dotmocracy • Heuristic evaluation • Logic model • Transformative impact • Critical tasks list • Scaling plan • Scoring and rating • Delphi survey / method / techniques • Multi-criteria decision analysis (MCDA) • Prioritizing and ranking • Beneficiary assessment • Scenario comparison (before/after) • Expert interviews

There are some practical recommendations on how you can effectively communicate your results:

- clearly and effectively transmit your technical and scientific concepts, findings and conclusions orally and in writing (language used should be cleared also for non-scientific community);
- listen attentively and for comprehension;
- reinforce words through empathetic body language and tone
- identify what your stakeholders need and why; for this purpose, use matrix provided below (Figure 13) to better analyse and reveal what drives the stakeholders, their underlying motivations and needs from the project.

Source: Roseke, 2019

Figure 10 Power-Interest matrix to define how to manage and communicate with stakeholders

The location on the c*hart (Figure 10)* shows how to manage stakeholders in regard to power-interest relation. *High power, high interest stakeholders* are major project stakeholders, they must be closely managed. *High power, low interest stakeholders* must be kept satisfied or they could derail the project over a minor issue. *Low power, high interest stakeholders* must be kept informed so they feel included in the decision-making process and don't exert undue influence to stop it. *Low power, low interest stakeholders* must be monitored to ensure they don't detail the project.

2 Toolbox for co-monitoring and co-evaluation of NBS

As already mentioned, the presented tools originated from different approaches applied to the co-creation (e.g. design thinking, social innovation, social capital, etc.), many of them are already successfully applied in different NBS related projects which involve the co-creation concept in implementing NBS. Key data on activities and related tools for co-monitoring and co-evaluation, including stakeholder engagement, but also testing, validating the NBS and stakeholders' reaction to it are provided in Table 8.

Table 8 Toolbox

Source: authors

Phase	**Co-monitoring and co-evaluation of NBS**
Main aims:	• to evaluate the NBS implemented and monitor the durability and quality of the interventions; • to reflex on co-monitoring and co-evaluation of co-creation process and its activities
Why participatory tools should be applied	• it requires a strong involvement of stakeholders who can support by measuring the success of all the process. A crucial moment of the pathway, indeed, where a strong effort to sustain all the process is required. This step requires original solutions, cohesion and constancy. • diverse stakeholders (especially, the end-users/beneficiaries of the NBS) will contribute to assess the impact of the interventions and success or failure of processes; • citizen science approach can be used to collect data to monitor and evaluate the implementation progress of NBS development.
Main activities:	Participatory processes (with close collaboration with stakeholders) on: • Validation of NBS in place • Verification of NBS co-benefits in place • Evaluation of co-creation process
Outcomes:	Reports on co-monitoring & co-evaluation activities Evaluation protocols
Actors involved:	All local stakeholders, project team, evaluation team
Suggested tools:	<u>Sub-cluster: Tools to engage stakeholders</u> • user personas • actor/stakeholder mapping • stakeholder CV tool • stakeholder visualization • people shadowing • people and connections map • expert interview • team canvas • service blueprint • skill share • who inspires us • building partnership map • world café • focus group • sketch mapping • future search conference

Phase	Co-monitoring and co-evaluation of NBS
	Sub-cluster: Tools to test and validate NBS • Prototype testing plan • Live prototyping • Usability testing • Assumption mapper / mapping • Blink testing / 5 seconds-blink testing • A/B tests • Story boarding / story wall • Learning loop • Improvement triggers
	Sub-cluster: Tools to support decision and evaluate the user's reactions to the NBS • Open nature innovation arena (Co-creation Arena) • I like – I wish – what if • Dotmocracy • Heuristic evaluation • Logic model • Transformative impact • Critical tasks list • Scaling plan • Scoring and rating • Delphi survey / method / techniques • Multi-criteria decision analysis (MCDA) • Prioritizing and ranking
	Sub-cluster: Tools to monitor and evaluate the NBS impact: • Logical framework analysis • Focus group • Social mapping • PPGIS • Geoquestionnaire • Logical framework analysis • Beneficiary assessment • Participant observation • Transect walk • Scenario planning • Participatory mapping • Scenario comparison (before/after) • Auto-Photography / participatory photographs • Field trips • Ethnographic fieldnotes

2.1 Sub-cluster 1: Tools to engage stakeholders

The tools included in this sub-cluster enable to:

- map, involve and engage stakeholders;
- launch the innovation partnerships within the NBS project.

Stakeholder maps can be used to analyse and understand who can and should be involved in a process or co-monitoring and co-evaluation, and how these stakeholders (people, organizations and aspects) are connected.

Related to Demonstrator and Collaborator sites, it will include assessment of risks in response to the questions:

- ✓ how to engage stakeholders?
- ✓ how stakeholders are exposed to hydro-meteorological hazards?
- ✓ what are their vulnerabilities, expectations, needs and capacities to implement NBS?

The identified and engaged stakeholders can later contribute to the assessment of NBS impact to be carried out in relation to benefits and co-benefits that reflect Key Performance Indicators (KPI) (see D1.2).

Co-creation activities with the application of the tools from this sub-cluster can ensure that contextual factors are considered in assessments of NBS impact, such as local cultural, social or biophysical factors.

This stage includes the following activities (see Table 9):

- o co-creation activities to involve/engage different groups of stakeholders;
- o analysis of stakeholders' preferences
- o co-creation approaches employed to assess the impact of NBS to reduce hydro-meteorological hazards and risks caused by them;
- o assessments of benefits and co-benefits provided by NBS.

Table 9 Co-creation approach and related tools for stakeholders' engagement

What	Why	How
Selection of stakeholders participating in co-creation	to identify the interested stakeholders and ensure their engagement	Can be derived from the stakeholder database (**Annex D of RECONECT D1.2**) built through the stakeholder mapping and analysis. The process of tools' application is presented for each tool in form of the **Factsheet in Annex of this deliverable**. **Template / Visualizations techniques:** • user personas • actor map/stakeholder mapping • stakeholder CV tool • stakeholder visualization • people & connections map • building partnership map **Workshop and communication techniques** • expert interview • team canvas • skill share • who inspire us • world café • focus group • future searching conference

What	Why	How
		Template/ visualization and communication techniques: • service blueprint • sketch mapping **Fieldwork techniques**: • people shadowing

Analysis of stakeholders' preferences

Collaboration with different local stakeholders can help to explore how acceptable, sustainable, and effective the preliminary selected measures are in relation to the location and how they reflect (consider) a range of environmental, social, economic, technical and health criteria. For this purpose, a Multi-Criteria Analysis (MCA) can be used to evaluate the feasibility of different NBS and its impact. Included in the MCA are decision models which contain options that need to be ranked or scored by stakeholders through a set of criteria, and a set of performance measures, which will be the raw scores for each decision option against each criterion (see RECONECT D1.2). The criteria in this analysis include selecting indicators from the Water, Nature and People categories (see section 5.2 of RECONECT D1.2).

Factsheets for each tool of this sub-cluster can be found in Annex' (Sub-cluster 1, Tools 1.1-1.16).

2.2 Sub-cluster 2: Tools to test and validate NBS

This sub-cluster provides the tools helping to focus on external users' problems and validate the desirability for NBS solutions. They not only help to validate the ideas but also the whole NBS project contributing to the process of gathering evidence around ideas about NBS and NBS project as it is through experimentation to make fast, informed and de-risked decisions. The purpose of testing and validation is to expose the idea to the practicality of the real world of all stakeholder groups before you build and release the final NBS intervention.

Table 10 Co-creation approach and related tools for testing and validating NSB

What	Why	How
Inviting stakeholders to test and validate ideas about NBS and the NBS project	to gather evidence around ideas about NBS and NBS project through experimentation to make fast, informed and de-risked decisions	The process of tools' application is presented for each tool in form of the **Factsheet in Annex of this deliverable**. **Template / Visualizations techniques:** • live prototyping • learning loop • improvement triggers **Workshop and communication techniques** • assumption mapper / mapping • blink testing / 5 seconds-blink testing • A/B tests • story boarding / story wall **Workshop and Visualizations techniques:** • prototype testing plan • usability testing • story world **Fieldwork techniques**: • transect walk • autho-photography • field trips

What	Why	How
		• ethnographic fieldnotes • ethnographic observation

Factsheets for each tool of this sub-cluster can be found in Annex' (Sub-cluster 2, Tools 2.1-2.10). Additionally, fieldwork techniques tools can be seen in Sub-cluster 4 (Tools 4.6-4.10).

2.3 Sub-cluster 3: Tools to support decision and evaluate the user's reactions to the NBS

There are a number of decision support tools which can help navigate complex decisions (table 11). Current NBS assessment frameworks tend to either give highly aggregated results, or are tailored to only one specific ecosystem service. Here we provide several tools which can be applied to the practical challenge of selecting a set of NBS to address multiple challenges. Several NBS related projects (UNaLab, GreenUP, CONNECTING Nature, etc.) confirmed that these tools proved useful for navigating the selection decision while seeking to balance a large number of possible benefits from NBS solutions. They also highlighted a key strength of the tools as prompt for co-production of knowledge and decisions.

These tools allow users to compare and visualise different NBS scenarios without and with climate change and/or population growth relative to the reference baseline situation or without and with NBS implementation. The tools can be useful for stakeholders that want to test and compare different NBS scenarios in order to evaluate the expected benefits of adopting specific NBS strategies, or to support decision-making with regard to NBS replication and up-scaling.

Table 11 Co-creation approach and related tools to support decisions and evaluate the user's reactions to the NBS

What	Why	How
Communication with stakeholders	to effectively mobilize participants to provide their feedback / reaction and support decision	**Template and visualization techniques:** • logic model • critical tasks list **Workshop and communication techniques**: • I like – I wish – what if • dotmocracy • heuristic evaluation • scaling plan • Delphi survey / method / techniques • prioritizing and ranking **Workshop / communication and template / visualization techniques**: • open nature innovation arena (co-creation arena) • transformative impact • scoring and rating • multi-criteria decision analysis (MCDA) • multiple perspective wheel
Selecting the criteria to address the issues of Water, Nature and People indicators	to adjust criteria to ensure local relevance of NBS to environmental, health, economic,	**Workshop / communication and template / visualization techniques**: • multi-criteria decision analysis (MCDA) • scoring and rating • multiple perspectives wheel • fuzzy cognitive maps **Workshop and communication techniques**:

What	Why	How
	socio-political, technical issues.	• Delphi survey/methods/techniques • focus group • expert interview (see Sub-cluster 1, Tool 1.7) • world café (see Sub-cluster 1, Tool 1.13) • dotmocracy • scaling plan

Factsheets for each tool of this sub-cluster can be found in Annex' (Sub-cluster 3, Tools 3.1-3.13). Additionally, fieldwork techniques tools can be seen in Sub-cluster 4 (Tools 4.6-4.10).

2.4 Sub-cluster 4: Tools to monitor and evaluate the NBS impact

Economic benefits, co-benefits and cost-assessments

NBS are all different in shape, size, service provided, local conditions, design, and construction and maintenance cost. They can provide a range of benefits and co-benefits spanning across the three challenge areas: Water, Nature and People. Acknowledging this variability is an important pre-requisite when it comes to assessing their economic and business impacts. Current research available on this topic, in particular on business models and governance schemes to distribute value, was conducted and further developed by CONENCTING Nature (Hölscher et al., 2020; Frantzeskaki, 2019), NATURVATIONS and other projects. Considering their main perspectives and ideas, RECONECT applies two approaches that could be used to identify NBS impacts:

- the 'Ecosystem Services' approach which puts more focus on the Social component of NBS (human health and well-being);
- the 'Total Economic Valuation' approach which is a more global and integrated method that can spot impacts on the Nature and Environment aspects of the NBS.

NBS impacts identification framework and Total Economic Valuation framework helping to asses all the values and especially economic impacts generated by NBS are presented in detail in RECONECT D1.2. Once impacts are identified, several methods exist to quantify them economically, e.g.: a) the Market Valuation Approach, b) the Revealed Preference Approach and the c) Stated Preferences Approach. These valuations need good local knowledge (culture, standard of life, real estate, habits of consumptions of locals, etc.) and good modelling tools (multiple parameters and data that need to be integrated). It is particularly complicated to estimate the monetary value of a whole NBS with this approach (especially in case of a large-scale NBS). This approach is more relevant for showing a trend or habits than to have accurate assessments of NBS. Stated preference approach can be perceived as simulated valuation method, which can be applied using questionnaire survey (e.g. Contingent Valuation Method) where respondents can be asked to express their willingness to increase the level of water quality in a stream, lake or rivers so that they might enjoy activities like swimming, boating, or fishing. Also, such approach as Choice modelling or group evaluation can help through choice experiments, contingent ranking, contingent rating and pair comparison, where participatory approach can also well contribute.

Because of the diversity of variables and the difficulty of capturing the value of ecosystems, an economic assessment of NBS is complex. Hence the importance of stakeholder engagement from the start. In a co-creation approach, stakeholders would be part of the discussion to expose the situation of their case (local needs, expectations, economic context, etc.), and, together with experts and researchers, find the best methods to assess the economic value of NBS.

- Some elements necessary to engage in a co-creation process for valorising NBS
- Clarity of the challenges addressed, type and location where the NBS would be established (geography, policy strategies in the NBS scope, etc.)

- List and type of existing or potentially new stakeholders in line with the methodology outlined in RECONECT D1.2, D2.1 and D4.2
- Values and services provided by NBS
- Impacts on stakeholders (people), water and nature.

Assessment of impact provided by NBS in reducing risk of hydro-meteorological hazards and other benefits

Defined as a process which facilitates exchange of information between scientists, decision-makers and citizens, co-creation is increasingly important to respond to hydro-meteorological hazards. Especially important is a stakeholder involvement that goes beyond limited consultation and results in collaboration (stakeholder engagement) which offers a number of benefits, particularly share of responsibilities in flood risk management. One of such methods refers to *citizen science* approach which is particularly important in order to address scarcity of data needed for risk assessment across temporal or spatial dimensions. Participatory approach is important for assessment of vulnerability, risk perceptions, and local priorities what provides critical information to inform NBS selection, for example through such methods as fuzzy cognitive maps which have been used to elucidate risk perceptions to support NBS (Gray et al., 2014; Özesmi and Özesmi, 2004; Santoro et al., 2019). Participatory modelling experiments play a role for hydro-meteorological risk model development related to computer simulations helping to generate new information about flood risks drawing on local knowledge, contributing towards more active stakeholder participation and a 'redistribution' of expertise (Landström et al., 2011). In this regard, equitable ways of working and ongoing communication are critical in such processes, which may require a greater investment of resources but can result in greater societal connectivity to hydro-meteorological hazards and their impacts, enabling to reflect on and consider different opinions and perspectives (Mehring et al., 2018).

Table 12 Co-creation approach and related tools to monitor and evaluate the NBS impact

What	Why	How
Comparing selected NBS to other types of measures	to analyse all pros and contras of selected NBS and their co-benefits	**Template / visualization techniques:** • scenario comparison • A/B tests (split tests) • SWOT Analysis • expert interview • thinking hats • head & heart & hands • 5 whys • Dotmocracy • world café **Workshop and communication techniques**: • focus group (see Tool 1.14)
Stakeholder involvement in data collection on hazards, exposures, vulnerabilities, impact evaluation	to validate and adapt expert estimates and models of risk; to get valuable insights from stakeholders on NBS impact assessment	**Workshop / communication and template / visualization techniques**: • social mapping • define your indicators • geoquestionnaire survey • sketch mapping (see Tool 1.15) • fuzzy cognitive maps (see Tool 3.14) • PPGIS (public participatory GIS) **Template / visualizations techniques**: • logical framework analysis • scenario comparison (before/after) **Field work techniques**: • participant observation

What	Why	How
		• transect walk • auto-photography / participatory photographs • field trips • ethnographic fieldnotes • ethnographic observation • participatory mapping **Field work and workshop / communication techniques**: • beneficiary assessment • (other) citizen science tools

Factsheets for each tool of this sub-cluster can be found in Annex' (Sub-cluster 4, Tools 4.1-4.15).

3 Conclusions

The presented report is linked to D2.6 where demonstrators have focused on describing the monitoring and evaluation procedures in support of the assessment of their NBS performance in achieving a selected number of sub-goals.

This deliverable presents a RECONECT's easy-to-use step-by-step protocol and practical guide/manual for co-monitoring and co-evaluation of performance of nature-based solutions (NBS) projects.

Sections 2-3 provide a hands-on toolbox consisting of four sub-clusters of tools and a desion-making Matrix of tools, which help to find the appropriate tool(s) for co-monitoring and co-evaluation of NBS according to the particular plans, goal, resources and capacities. This toolbox consists of the following sub-clusters: 1) Tools to engage stakeholders; 2) Tools to test and validate NBS; 3) Tools to support decision and evaluate the user's reactions to the NBS; 4) Tools to monitor and evaluate the NBS impact, providing in total 55 various participatory methods and tools and explaining how and under what conditions they can be put into practice (see Annex – Factsheets of tools).

The report aims to support RECONECT Collaborators, but also other NBS researchers and practitioners to select helpful and valid tools for the right purpose and at the right moment of co-monitoring and co-evaluation of NBS performance. Using the suggested protocol, manual and the tools might increase the understanding of the value of co-creation / participatory approach and its practical outcomes as well as provides support to involve and engage stakeholders in the phases of co-monitoring and co-evaluation of NBS project.

The report, and in particular, the presented six-steps-protocol and manual, are based on the experience of Demonstrators and their collaboration with local/regional stakeholders providing a practical guidance on how to design, implement and facilitate the process of co-monitoring and co-evaluation of NBS performance in achieving a selected number of sub-goals. Extended with the approaches from existing literature on co-evaluation of NBS, it forms a basis for further co-monitoring and co-evaluation activities in Collaborator sites. Thus, also Collaborators will benefit from the using this report and the suggested toolbox (tools) in the later stages of the realization of their NBS processes.

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ANNEX 1: Factsheets of tools

Sub-cluster 1: Tools to engage stakeholders

Tool 1.1. User personas

Main goal: The User Personas is a tool designed to help you visualise and better understand your customer segment. It is the starting point of your problem exploration journey. The key to completing a User Persona is realising that it's never finished. You will be continuously updating it as you gather more stories and insights from your interactions with real customers.

Format: Template

Timeframe: 1 hour

Group size: 1-10 people

Facilitation level: medium

Effort/Level of expertise: middle

Required material: Persona templates, Pens, Post-its

Steps:

1. Have a group discussion about what kind of persona(s) fall within your scope – 15 min.
2. Individually fill in a User Personas template, clearly indicate with a "?" the things you assume to be true, but are not sure about – 15 min.
3. Present your User Personas and decide on the persona you want to focus on as a starting point – 15 min.
4. Have a final discussion on what you don't know and what you would like to find out about your persona. This will be important for your problem validation interviews – 15 min.

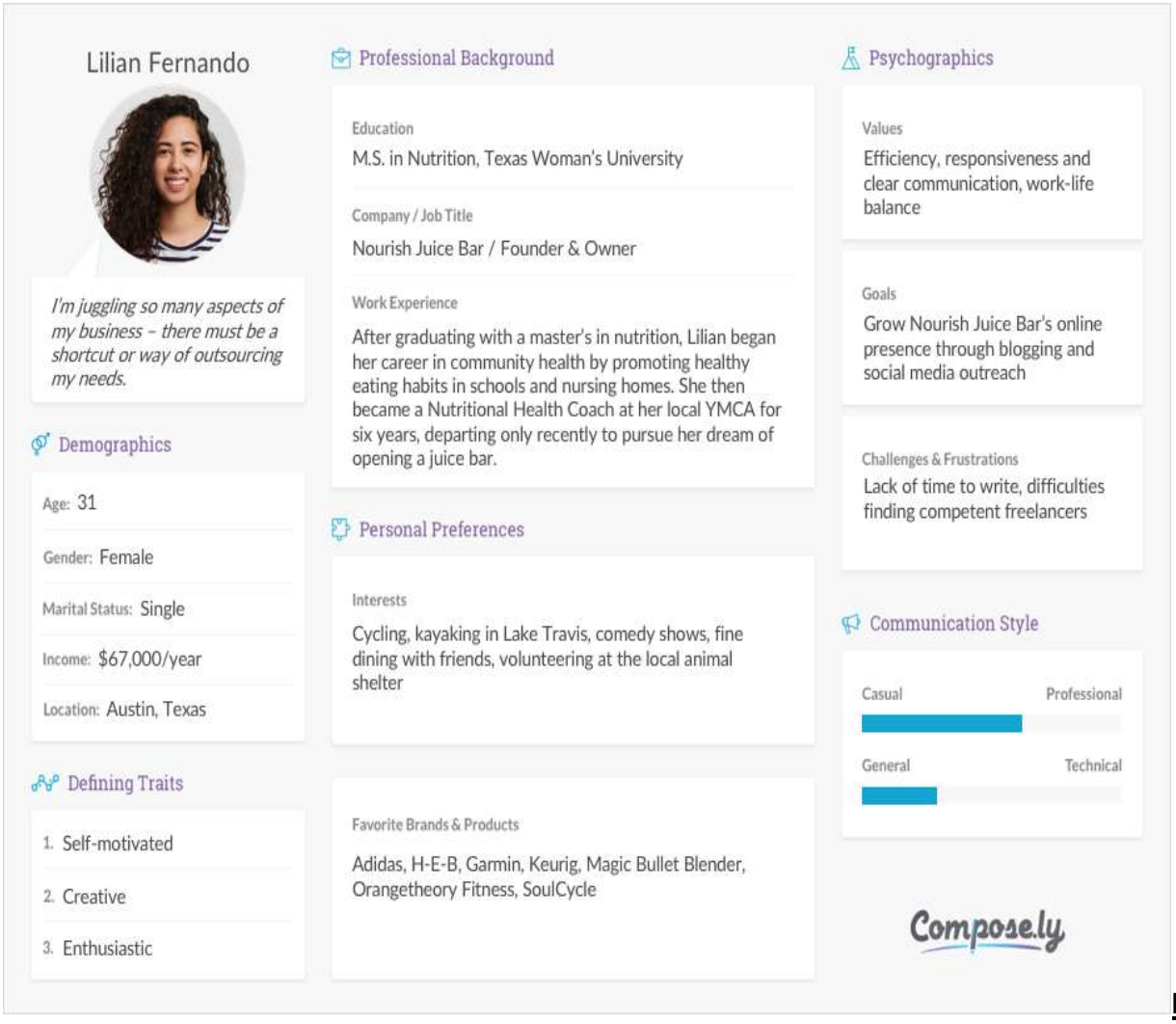
Benefits/why to use this tool:

- User Personas can help you understand users' motivations and needs and how these translate to the usability of your product or service.
- They can help you understand negative issues such as perceived obstacles or problems in your product or service.
- If you define and understand personas accurately it should give you a better handle on the sort of language, messages, imagery that your users will associate with and respond to and the sort of aspirations, hopes and needs they hold and attribute to artefacts and items they desire or own.

Template / how it looks like: see Figure 1.1.1.

Demographic	Professional	Psychographic
Name	Education	Attitudes
Gender	Job title/industry	Goals
Age	Income (individual or household)	Frustrations
Race/ethnicity	Work experience	Interests
Marital status		Favourite products and brands
Location		

a



b

Figure 1.1.1. Information to Include in Your User Personas Profile (a) and User persona example (b)

Source: own representation (a), https://compose.ly/strategy/user-persona-guide/ (b)

Remarques/tips: You can focus on multiple personas, but this means that you will have to complete all exercises for each persona. It's often better to start with one, build and test a solution, and then start focusing on expanding your market. Digitally, user personas profiles can be created in Mural: https://www.mural.co/templates/persona-grid or Miro: https://miro.com/templates/personas/?gspk=ZGFyaW5laWNoNzkxMQ&gsxid=G95H1it7BRfk&utm_campaign=darineich7911&utm_medium=affiliate&utm_source=referral

Source/further reading:

https://compose.ly/strategy/user-persona-guide/
https://www.mural.co/templates/persona-grid
https://miro.com/templates/personas/?gspk=ZGFyaW5laWNoNzkxMQ&gsxid=G95H1it7BRfk&utm_campaign=darineich7911&utm_medium=affiliate&utm_source=referral

Tool 1.2. Actors Map / Stakeholder mapping

Main goal: it helps to understand general landscape (e.g., key actors, organizations, initiatives), connections (to determine who needs to be involved, to explore various actors' roles in the system; to diagnose the strength of connections among actors; to consider how relationships, roles, or information flows are changing), patterns (to determine where the energy is in the system and where there are gaps or blockages; to understand how structures are changing) and perspectives (to consider who is, has been, or should be involved, to identify opportunities to build new relationships and explore other parts of the system).

Format: Template. The Actors map represents the relationship between stakeholders. It's a view of the service/ system and its context.

Timeframe: it typically takes 1.5 – 2 hours to facilitate. Preparation needs in average 8-10 hours.

(Who?) Actors involved: all relevant stakeholders

Group size: (number of participants): not preliminary defined

Facilitation level: advanced

Level of expertise/Effort: middle

Required material: Facilitation agenda and talking points, a large (approximately 36" x 48") printed copy of the draft system frame or actor map; a set of prepopulated sticky notes (to be developed during the prep process, below); blank sticky notes; sharpie markers in multiple colors; dot stickers in multiple colours; flip chart and paper.

Outcomes: A map of all the stakeholders and their relationship with each other.

Steps:

1. *Feasibility assessment*: Is actor mapping right for your project? You can use this tool if you focus on the "who" of the system and agreement on the boundaries of the system actors being mapped (e.g., by geography, specificity)
2. *Preparation*:
   a) Frame activity:
      • Identify the topic and set clear boundaries
      • Frame the system
      • Identify an initial set of key actors
   b) Prepare a draft map (optional) • Populate the draft frame with key actors
3. *Actor mapping session*:
   a) Arrange a room where you can focus and work for a couple of hours.
   b) List down the core stakeholders on a big sheet of paper.
   c) List down the sub groups of stakeholders.
   d) Connect the stakeholders to each other and describe how they relate to each other.
   e) Write down the specifics of the relationships between the stakeholders, how, where and why do they communicate?
   f) Document the end result.

Benefits /Why to use this tool: It is a visual depiction of the key organizations and/or individuals that make up a system, including those directly affected by the system as well as those whose actions influence the system; at the beginning of a project it helps to understand relationships between the different parties.

How it looks like / template: see Figures 1.2.1-.1.2.2.

Figure 1.2.1. Mapping actors, networks and power centres

Source: https://advocacyguide.icpolicyadvocacy.org/43-map-the-actors-networks-and-power-centers)

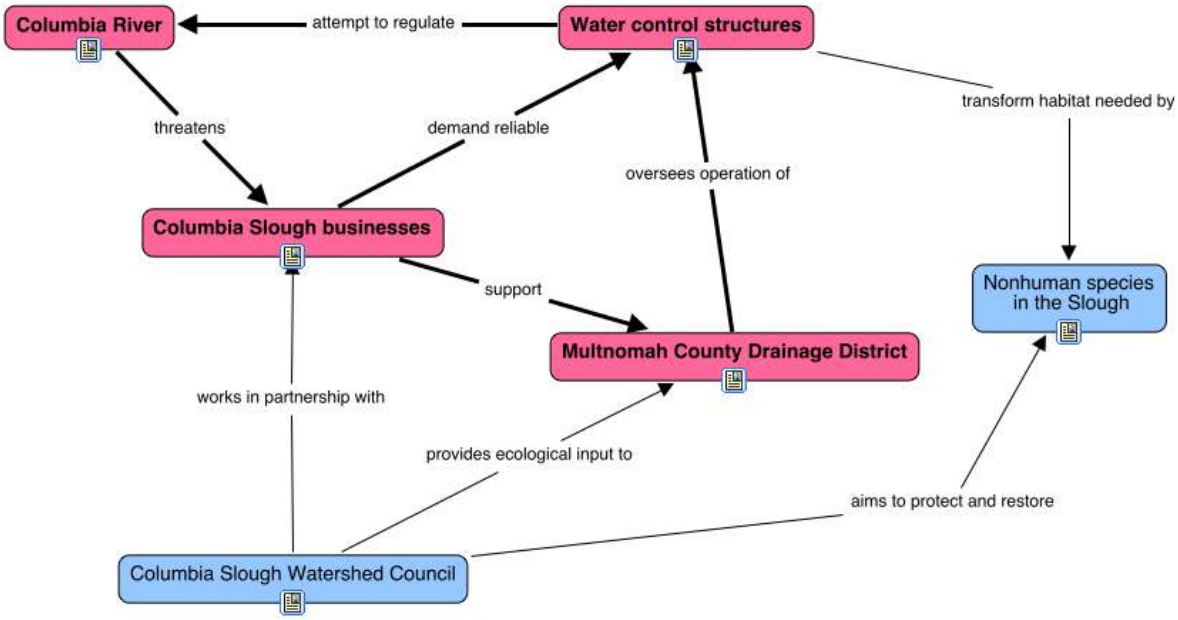


Figure 1.2.2. Actor map, Columbia Slough, Oregon

Source: https://jimproctor.us/envs/mapping-actors-processes/

Remarques / tips: Actor maps are sometimes referred to as stakeholder maps; however, given that important influencers (e.g., government) are not always stakeholders in a system change initiative, we use the more inclusive term “actor maps” for purposes of this guide. Careful preparation in advance of a live actor mapping session is critical to success. During the preparation process, the facilitator or facilitation team will make several important strategic decisions. For example, they might consider questions such as: What will be the boundaries

around the issue at hand? What is the right altitude to focus the map on? What level of detail is appropriate for the actor map? They will then develop a draft "system frame" (see below) for participants to build on. This preparatory work will provide guidance to mapping participants and help ensure a productive, energizing session.

Actor Mapping versus Stakeholder Analysis: Actor mapping is related to, but fundamentally distinct from, traditional stakeholder analysis. Stakeholder analysis is "a process of systematically gathering and analyzing qualitative information to determine whose interests should be taken into account when developing and/or implementing a policy or program."1 Stakeholder analysis seeks to assess individuals' or groups' ability to influence specific projects, policies, or outcomes. The goal of these analyses is typically to produce a prioritized list of key individuals or groups to target as part of an action plan. By contrast, actor mapping explores the relationships and connections among actors, as well as their relationships to a given issue, project, or intended outcome. The purpose of actor mapping is to identify opportunities to improve a system's overall performance by, for example, strengthening weak connections or filling gaps in the system. In addition, we avoid using the word "stakeholder" because some actors that may not have a "stake" in a particular initiative or outcomes may still wield influence over the initiative or be influenced by it.

Source/further reading:

1. FSG (2021) Reimaging social change: Guide to actor mapping https://static1.squarespace.com/static/5c90fe4716b640613581ddff/t/5ce30de637c30800018ffa89/1558384106396/Guide-to-Actor-Mapping.pdf
2. Morelli N., Tollestrup C. (2009) New representation techniques for designing in a systemic perspective. Nordes. Paper presented at Design Inquires, Stockholm.
3. Design method toolkit. Digital society school. https://toolkits.dss.cloud/design/method-card/actors-map/
4. ICPA (2014) Map the actors, networks, and power centers. In: Making research evidence matter. A guide to policy advocacy in transition countries. International Research Center for Policy advocacy. https://advocacyguide.icpolicyadvocacy.org/43-map-the-actors-networks-and-power-centers
5. ENVS resources (2021) Mapping Actors and Processes. Available at: (https://jimproctor.us/envs/mapping-actors-processes/)

Tool 1.3. Stakeholder CV tool

Main goal: combining a series of proven methods of stakeholder analysis, it aims to help understanding stakeholders, their background, thoughts, beliefs, expectations and relations. It can help resolve conflicts that might arise during the co-creation process and to increase trust between stakeholders and the project itself.

Format: Template

Timeframe: 1 day

Group size: 1

Facilitation level: advanced

Effort/Level of expertise: middle

Required material: PC, template

Steps:

1) Gather general information.
2) Prioritise stakeholders.
3) Identify type of stakeholder.
4) Define expectations.
5) Identify gaps and relationships amongst stakeholders (such tools can be used as semi-structured interview, actor maps, etc.).
6) Prioritise gaps (you need to grade each gap on the Effort to solve, Impact if solved, Frequency).
7) Identify messages (the message needs to persuade the stakeholders to support and engage with the project and/or goals. It needs to show the benefits of what the project is doing and focus on key performance drivers, such as increasing profitability or delivering real improvements.

Benefits/why to use this tool:

- Insight into user personas.
- In depth analysis of stakeholders.

Template / how it looks like: As a traditional CV template.

Remarques/tips: Steps 2 and 3 share a form. Steps 6 and 7 include the definition of the workplan.

Source/further reading:

DeLosRíos-White M.I., Roebeling P., Valente S., Vaittinen I. (2020) Mapping the Life Cycle Co-Creation Process of Nature-Based Solutions for Urban Climate Change Adaptation. Resources 9, 39; doi:10.3390/resources9040039

https://unalab.enoll.org/stakeholder-cv-tool/

Tool 1.4. Stakeholder visualization

Main goal: Stakeholder visualization is a tool that will help you gather deeper knowledge of who is your stakeholder, what are his/her needs, motivation and drivers for participating in your innovation. This tool acknowledges differences among preferences, routines and motivation stakeholders can have. Creating a visual summary of stakeholder's persona will point you to the appropriate ways of customizing your activities, forming an approach to a particular issue and take into account diversity of needs and desires stakeholders may have. This tool can be practiced to get more insights on already identified stakeholders (after Stakeholder Mapping). It can also help you determine what are the characteristics of stakeholders you need to involve and that way help you detect those specific ones (before Stakeholders Mapping).

Format: Template

Timeframe: 45 min

Group size: 1-2 people of your team

Facilitation level: beginner

Level of expertise/effort: easy

Required material: Stakeholder visualisation worksheet, pens, post-its

Steps:

After listing your stakeholders (see People and Connections Map and Stakeholders Maps) use Stakeholder visualization to portrait a typical person that could represent one of the stakeholders. Even though it might not be a real person (could be an organization, network etc.), try to describe them as a person interpreting their human characteristics. Have each team member visualizing different stakeholder and describing them in the sheet. Compare commonalities and differences between the visualizations and try to discuss the reasons behind the descriptions and add more details. Keep in mind to visualize the stakeholder's persona based upon the common characteristics of the group stakeholder represents.

Benefits/why to use this tool: to learn who are the people that have a stake in your issue

Template / how it looks like: see Figure 1.4.1.

Remarques / tips: Try to include people who have a good understanding of the problem/challenge and the context in which the solution is to be created.

Source/further eading:

INNOWEAVE – Practical Tools for Social Innovation

https://www.silearning.eu/wp-content/uploads/2017/04/stakeholder-visualisation.pdf

Figure 1.4.1. Template for stakeholder visualization

Source: https://www.silearning.eu/wp-content/uploads/2017/04/stakeholder-visualisation.pdf

Tool 1.5. People Shadowing

Main goal: to collect inputs from others by observing and learning from everyday life. People shadowing means becoming someone's shadow for a while. Following someone, or a group of people, as they live their everyday life, or go about their daily work helps to understand the environment they are part of. Main goal is to collect inputs from others by observing and learning from everyday life. It also allows for observation for yourself the contextual details that can influence a person's behaviour and motivations.

Format: Fieldwork

Timeframe: 1 day

Group size: 2 people

Facilitation level: medium

Level of expertise/effort: Shadowing is, by its very nature, a qualitative research technique. It is time consuming and resource intensive to be conducted on a massive scale. The key principle of shadowing is that the researcher acts as an observer. They are not to interfere with the research subject (participant) as that interference might change the way that the subject behaves in any given circumstance. Thus, shadowing is somewhat different from customer observational interviewing practices in which the researcher fully interacts with the participant while they observe them in their usual environment. Requires some dialog with colleagues/peers. Plan for some time to interact and fill out in collaboration over a day maybe.

Required material: paper, pen, camera / recorder

Steps:

1) Determine a set of important questions before starting shadowing:
    - Who to follow?
    - How to be actively involved when you get there?
    - The kind of information you're looking out for, and the ways in which you might want to record what you find.
2) Visit and accompany the target person in her/his natural environment.
3) Take notes and photos, and fill out the template for the person you follow. But also ask your team to fill out a similar sheet for each person they follow. This is a structured way to compare your observations across the various 'participants' you and your team shadowed.
4) The qualitative data collected is analysed to determine typical or important routines, limiting factors, etc.

Benefits /why to use this tool:

- It helps to familiarise yourself with a certain practice or group of people.
- Observing people can reveal hidden aspects that might be the core issue or even possible solution.
- Your observations can act not only as inspiration but also a guide to help reach the core of how your work impacts people whose lives you want to make a difference to.

Template / how it looks like: see Figure 1.5.1.

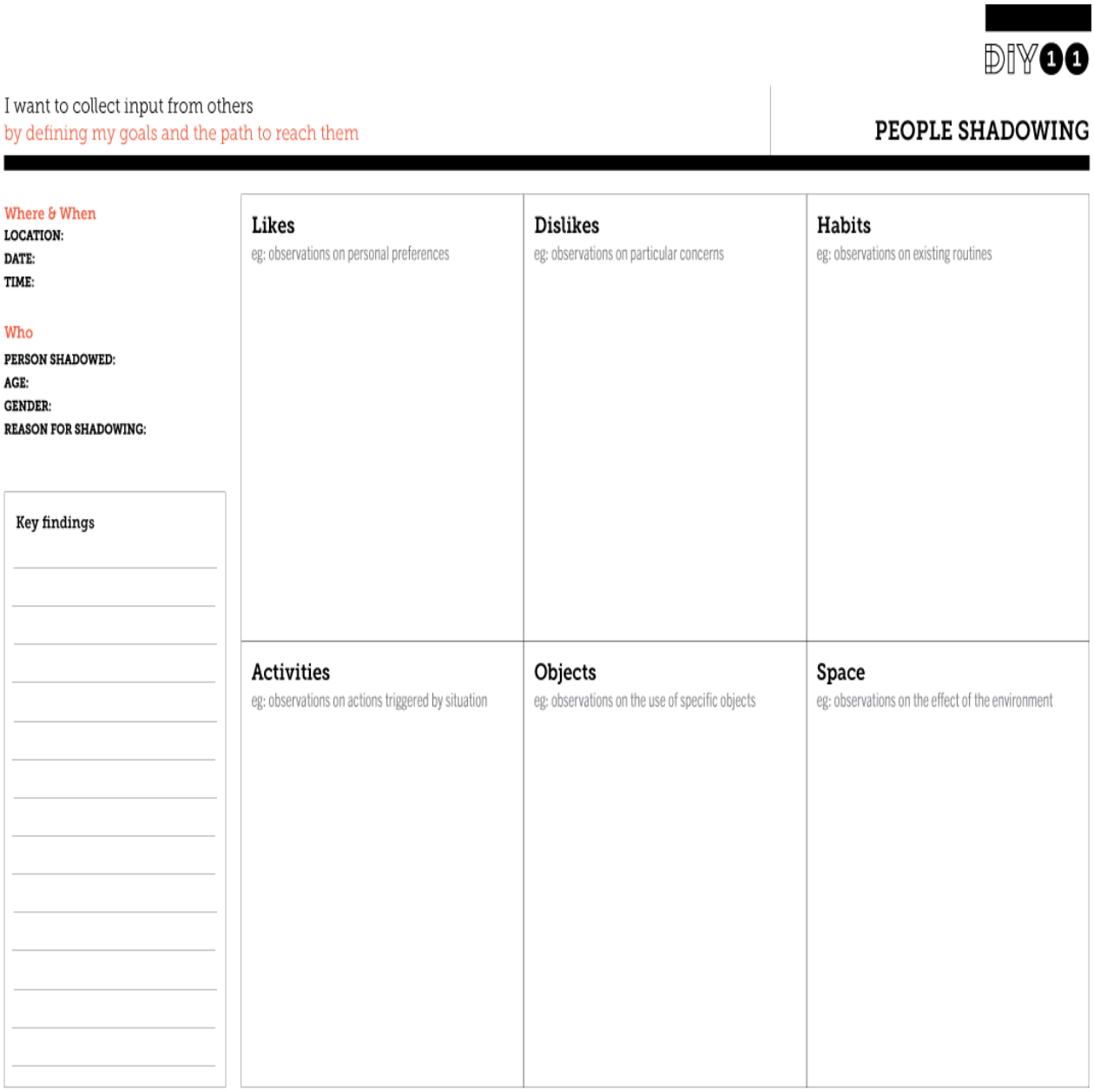


Figure 1.5.1. People shadowing template
Source: https://diytoolkit.org/tools/shadowing/

Important remarque/notes: please be aware of and consider what is socially accepted within the specific situation or culture. It is important to respect the person's space and make sure they are comfortable. Thus, to ask for permission for observation would be needed.

Source/ Further reading:

Lovlie L.,Reason B.,Polaine A. (2013) Service Design: From Insight to Implementation. p54-p57. Rosenfeld Media

Need finding: People shadowing. UnaLab: Tools for co-creation. Available at: https://unalab.enoll.org/shadowing-stakeholders/

DIY: Practical tools to trigger and support social innovation. Available at: https://diytoolkit.org/tools/shadowing/

Tool 1.6. People & Connections Map

Main goal: The People & Connections Map is a visualization tool used to identify stakeholders you are trying to reach and how. It is a tool for mapping actors that surround you that could potentially become your partner, user or supporter. These might include people, communities, funders, networks etc. All of them can represent a resource to your innovation and link to your group goal or your innovation.

Format: Template

Timeframe: 60 min

Group size: not preliminary defined

Facilitation level: beginner

Effort / Level of expertise: middle

Required material: People and Connection map sheet/template (see below), pens

Steps: Start from the centre point of the tool by listing your target audience (beneficiaries, users, customers) who can benefit from your idea. Then work towards the outer layers and list stakeholders that surround you or are somehow related to the work you do. The closer they are positioned to the centre point the stronger is their influence or value. Once you fill in the worksheet, revise the input, one by one, and reconsider possible repositions together with your team. By reviewing the stakeholders, you will encourage team discussion and gain better understanding of relationships and connections you are trying to build. When finished, you will get a clear, visual stakeholder graphic to help you highlight and communicate the main focus of your work.

Benefits/ why to use this tool: this visualization tool helps to identify stakeholders you are trying to reach and find the ways how to do it better.

Template / how it looks like: see Figure 1.6.1.

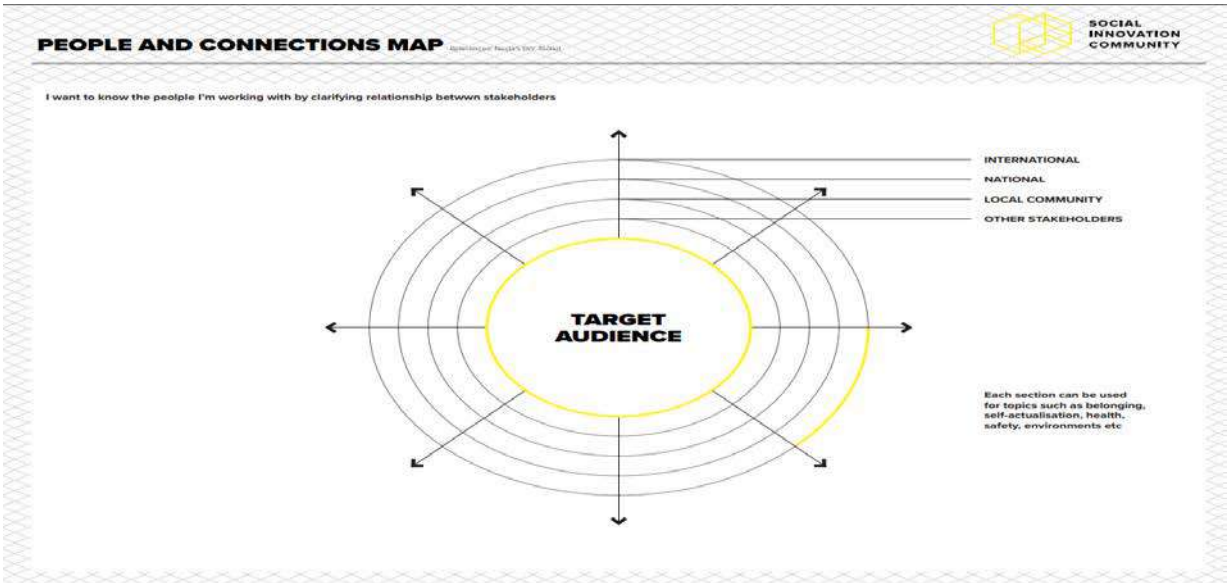


Figure 1.6.1. People & Connections Map template

Source: https://www.silearning.eu/wp-content/uploads/2017/04/people-and-connections-map.pdf

Remarques / tips: n.a.

Source/ Further reading:

https://www.silearning.eu/wp-content/uploads/2017/04/people-and-connections-map.pdf

Tool 1.7. Expert Interview

Main goal: to collect insights from experts and relevant keypersons inside your local FR city partnership that are crucial at this stage, have authority and require to be engaged in the process from the very beginning.

Experts can get you up to speed quickly on a topic, giving you key insights into relevant history, context, and innovations.

Format: Workshops / communication (a series of **semi-structured** interviews with key persons and institutions).

Outcomes: 1) The interviews with a series of relevant contacts on site. B) A short wrap-up report with the main information gained by all the interviewees.

(Who?) Actors involved: Experts that can provide a system-level view on the proposed NBS project and can advise on successes and failures; key-decision makers of the local public authorities are the target persons for this activity, that can be simply identified by the NBS project partners or can benefit from the activity with the tool “Stakeholder mapping”.

Group size: one facilitator and one expert (in other words: Interviewer and expert).

Facilitation level: medium

Level of Difficulty/ Effort: middle – easy to prepare (Approximately 30 minutes), but needs time to transcribe and analyse the interview content (in accordance to the previous experience, in average 2 hours).

Timeframe: 60-90 min, in some cases 30-40 minutes per interview.

Required materials: The printout of the interview track; the constellation map resulting from Tool 1.1, possibly printed in A3 format or larger; the printout of the NBS project Focus (claim); the geographical map of the NBS site with highlights and possibly the envisioned NBSs; recorder; other relevant material. Pens, camera, notebook.

Steps:

1) Make sure to identify key persons at the local level who did not attend the previous meeting and activities but whose opinion is very important for the NBS project.
2) Prepare and send an invitation letter to the interview expert explaining briefly what NBS project is, why you selected this expert for interview (what particular expertise from the expert/institution is needed).
3) Interview starts: short introduction by the facilitator (project aims, motivation, co-benefits, why this NBS project could be relevant for her/his institution)
4) Interaction with the expert - does s/he agree on the NBS project constellation proposed by the project team? Where does s/he see her/his institution in this picture? Does s/he agree on the focus/claim of the project? How exactly could her/his institution contribute to the NBS project? Strengths and weaknesses of the institution in relation to the proposed NBS project. Would the institution like to be involved in the NBS project? If yes, why and how? What will the institution
5) bring in and what s/he would like to get from this involvement?
6) Any contacts or previous collaboration experience with the NBS project partners?
7) In case, does the institution you represent need any capacity building activity?
8) Ask permission to record interview.
9) Record the interview.
10) Invite the guest to join future activities.
11) Report the main relevant information that can enrich the NBS project and strategy. This will be included in the follow-up report. You can organize the gained content according to the table below that recalls the (semi-structured) interview questions.

Benefits/Why to use this tool: to validate the focus and role of NBS project in the overall local strategy vision as defined by Tools 1.1 and 1.2 and bring in new perspectives and relevant information by local stakeholders, experts and local key decision makers who did not attend the first exploration meetings.

How it looks like / template: see Figure 1.7.1.

Structure of the interview questions (for a semi structured interview with an expert)

1. **Short intro about your project and your role there**
2. **Open discovery questions**

Purpose	Example of questions
to keep the conversation going , these questions require more than a single word answer (like yes/no); note: avoid starting questions by "did you" / "have you" / "were you"	"Tell me about …" "Could you describe to me how you… / your experience with…?" Frequency and quantity: "How often do you…?" "How much do you know about this topic?" "What … do you use / do ?" "Why do you …"

3. **Understanding tasks / activities**

Purpose	Example of questions
to understand how people perform tasks and activities	"Can you describe how you / how you would [task]?" "What are all the things you need to do in order to [task?]" Sequence: "Walk me through [task], how would you?" Comparison: "What is the difference between [task 1] and [other task]?"

4. **Performing / showing**

Purpose	Example of questions
to enrich the knowledge about the stakeholder's tasks	„Please / can you show me how you perform the… [task]" Role playing: "Let's pretend I'm a colleague who knows nothing about this, can you guide me so that I could do it myself afterwards?"

5. **Recalling the past / anticipating the future**

Purpose	Example of questions
to get insight about the events in the past; note: people have a hard time projecting in the future	"Can you recall a situation when you …, what did you do?" "Can you tell me about your most significant/ memorable experience/interaction with…?" "How do you think … is going to help you?" "Could you describe the ideal outcome / experience…?"

6. **Opinions / points of view / attitude and projections**

Purpose	Example of questions
	"What do you think about …?" "What do you like/dislike about…?" "What would your partner/colleague think of that? "Some people …, what is your opinion on that?" "Last week I interviewed people who did // said … What do you think of that idea / approach?

7. **Talking about problems and pain points**

Purpose	Example of questions
to understand issues / pain points in order to try to solve them	"How does this problem impact you?" "How did you solve that issue ?" "What's the hardest / most frustrating part about …?"

Figure 1.7.1. Protocol navigating expert interview

Source: own representation based on the authors' research

Source/further reading:

Meuser M., Nagel U. (2009) The Expert Interview and Changes in Knowledge Production. In: Bogner A., Littig B., Menz W. (eds) Interviewing Experts. Research Methods Series. Palgrave Macmillan, London. https://doi.org/10.1057/9780230244276_2

Bogner A., Littig B., Menz W. (2009) Introduction: Expert Interviews — An Introduction to a New Methodological Debate. In: Bogner A., Littig B., Menz W. (eds) Interviewing Experts. Research Methods Series. Palgrave Macmillan, London. https://doi.org/10.1057/9780230244276_1

Wernitz F. (2021) The expert interview is often considered a simple research method. IUBH. https://blog.iubh.de/en/the-expert-interview-is-often-considered-a-simple-research-method/

DesignKit (n.y.). Expert Interview. https://www.designkit.org/methods/expert-interview

DeepBench (n.y.) The Definitive Guide for Conducting Expert Interviews. https://deepbench.s3.amazonaws.com/The_Definitive_Guide_for_Conducting_Expert_Interviews_DeepBench.pdf

https://www.silearning.eu/wp-content/uploads/2017/04/people-and-connections-map.pdf

Tool 1.8. Team canvas

Main goal: Team Canvas helps brining team members on the same page by following structured communication principles. Team Canvas is a strategic framework used to align teams and achieve cohesion among team values, goals and performances. It can be used is situations like forming a team, adding a new team member to the group, clarifying goals, addressing overall team achievements etc. It summarizes all the elements needed for a team to get the overview of group performance.

Format: Workshop / Communication

Timeframe: 90-120 minutes

Group size: 2-8 participants

Facilitation level: Medium

Level of expertise/effort: middle

Required material: Team Canvas Basic recreated on a whiteboard or on a big piece of paper (e.g. flipchart paper), blocks of coloured post-its, pens, and timer

Steps:

To fill in the Team Canvas gather a group for a 90-120-minute team session. Start with the introduction of defining the session's goal and explaining the Team Canvas segments. Go through each segment making sure you asked questions from all segments. Spend 10-15 on each area and encourage participants to write their answers on post-it notes and discuss about them with the team.

There are fields that all team should agree on:

1. People and Roles;
2. Goals;
3. Purpose;
4. Values;
5. Rules and culture.

The rest of the fields can be filled in individually, with no particular need to be agreed upon.

End a session with a Wrap up and ask the team members to tell about one insight they gained during the process.

Benefits/why to use this tool: It helps to better understand how to organize the team, align tasks, resolve conflicts and build productive culture?

Template / how it looks like: see Figure 1.8.1.

Remarques / tips: n.a.

Source/further reading:

https://www.silearning.eu/tools-archive/team-canvas/

Figure 1.8.1. Team canvas example
Source: https://www.silearning.eu/tools-archive/team-canvas/

Tool 1.9. Service blueprint

Main goal: to map out the entire process of service delivery, above and below the line of visibility. Understand and design a service experience and find ways to improve it through the mapping of processes and stakeholders.

A service blueprint is a diagram that displays the entire process of service delivery, by listing all the activities that happen at each stage, performed by the different roles involved. The service blueprint is built by first listing all the actors involved in the service process on a vertical axis, and all the steps required to deliver the service on the horizontal axis. The resulting matrix allows to represent the flow of actions that each role needs to perform along the process, highlighting the actions that the user can see (above the line of visibility) and the ones that happen in the back-office (below the line of visibility). Roles can be performed by human beings or other types of entities (organizations, departments, artificial intelligences, machines, etc.).

Format: Template (diagram) + Workshop

Outcomes: Blueprint diagrams

(Who?) Actors involved: Facilitator(s), customers, team members

Group size: from 4 people onwards

Level of difficulty/Effort: easy

Time frame: 1-3,5 h

Required materials: blueprint diagram templates

Steps:

1. Start mapping the existing process in the service scenario. At this stage, you can consider interviewing participants to get a realistic perspective of the scenario.

2. Map out the experience, and chart the actions that participants will take, in chronological order.

3. Build the map. Once the participants journey has been mapped out, the design of the processes, actors, support systems and technologies that exist behind the scenes must continue to be developed.

4. Dive into roles and responsibilities. Specify lines of interaction, where the participants interact with your service or employees; lines of visibility, where your organizational processes become invisible to the participants; and internal lines of action, where those who do not come into contact with the participants, however, intervene to support the service.

5. Illustrate cross-functional relationships. Use arrows to illustrate the relationships and dependencies that cross various steps on the map. A single arrow indicates that a role flows in that direction, while a double arrow means that two roles are interdependent.

6. Analyse and draw conclusions about the diagrams

Benefits/Why to use this tool: Blueprint provides different approaches to the challenge of understanding current state processes and helps to capture exactly how the business works. it helps to understand cross-functional relationships and align front-stage and back-stage processes.

How it looks like/template: see Figure 1.9.1.

Figure 1.9.1. Services Blueprint examples

Source: https://servicedesigntools.org/tools/service-blueprint

Remarques/Notes: Business and financial approach. Use it to analyse an existing service or specify a well-defined concept, not as an ideation tool.

Source/further reading:

Lynn G. Shostack (2001) How to Design a Service, in European Journal of Marketing n°16
Kalakota R., M.Robinson (2004) Services Blueprint: Roadmap for Execution, Addison-Wesley, Boston.
Mary Jo Bitner, Amy L. Ostrom, Felicia N. Morgan (2007) Service Blueprinting: A Practical Tool for Service Innovation, Centre for Services Leadership, Arizona State University, paper.
https://miro.com/templates/service-blueprint/
https://servicedesigntools.org/tools/service-blueprint
https://www.blueprintsys.com/why-blueprint

Tool 1.10. Skill share

Main goal: "Skill share" is a great tool for innovators to determine internal capacities for innovating and skills they have or may need to achieve their goal. This tool is also great for detecting personal values, motivational triggers and roles of each team member and developing mutual understanding and respect.

Format: Workshop

Timeframe: 45 min

Group size: 5 people

Facilitation level: beginner

Level of expertise: easy

Required material: A4 papers, pens, camera (optional: stickers, photos, markers, coloured papers)

Steps:

Tool template consists of detailed instructions for executing this activity. Follow the instructions for achieving maximum results:

1) HAND OUT TWO SHEETS OF PAPER PER GROUP MEMBER. ON THE FIRST SHEET, HAVE EACH PERSON WRITE:
   • The name they'd like the other group members to call them
   • The skills and talents they have and believe are relevant
   • One recent accomplishment
2) HAND OUT TWO SHEETS OF PAPER PER GROUP MEMBER. ON THE FIRST SHEET, HAVE EACH PERSON WRITE:
   • The name they'd like the other group members to call them
   • The skills and talents they have and believe are relevant
   • One recent accomplishment
3) ASK EACH GROUP MEMBER TO SHARE THEIR FIRST PAGE AND WHATEVER THEY MADE ON THE SECOND PAGE. Take notes about what they share, and consider taking pictures as they present so everyone in the group has a record of who each person is for future group members.
4) ONCE EVERYBODY HAS SHARED, ASK PEOPLE TO PUT UP THEIR TWO SHEETS OF PAPER ON THE WALL. LEAD A DISCUSSION WITH THE GROUP AND CAPTURE ON A LARGE PIECE OF PAPER:
   • The types of skills your team has a lot of
   • The skills your team still needs
   Keep this visible where you meet, so group members are reminded of these skills.

Benefits/why to apply this tool: it helps to identify what skills do we need to reach our goals

Template / how it looks like: -

Remarques / tips: Activity needs to be done in a group. Try to include people with diverse background, experience and age.

Source/further reading:

https://www.silearning.eu/wp-content/uploads/2017/04/skill-share.pdf

Tool 1.11. Who inspires us

Main goal: This tool can be used to identify people from team's community that can help the group to solve the challenge or simply inspire them during the innovation process. This tool can later on help the team in the identification of potential stakeholders and potential beneficiaries of the innovation.

Format: Workshop

Timeframe: 40 minutes

Group size: 5 people

Facilitation level: medium

Level of expertise/effort: easy to use

Required material: A4 papers, pens (optional: stickers, photos, markers, post-its)

Steps: Tool template consists of detailed instructions for executing this activity. Follow the instructions for achieving maximum results:

1) Divide your group into two teams and give them a piece of paper.
2) Ask each team to write down the names of as many people as possible who could help them solve a problem. These people could be famous, infamous, personal family, friends, and other connections. Note the reasons why group members chose each person.
3) Give each team five minutes to share their list with the other group. As the teams share, have someone write down all of the names and reasons why each person was chosen on a sheet of paper everyone can see.
4) Next, have the entire group look at the names on the list and talk about what all these people have in common. Write down these commonalities and any other interesting discussion points for everyone to see. Put these notes on the wall so everyone can remember who inspires them and who could help them in the future.

Benefits/why to use this tool: it helps to better understand who are the people from my community that can help me and inspire me solve the challenge?

Template / how it looks like: not pre-defined

Remarques / tips: -

Source/further reading:

https://www.silearning.eu/wp-content/uploads/2017/04/who-inspires-us.pdf

Collective Action Toolkit by Frog Design.

Tool 1.12. Building partnership map

Main goal: Many complex problems have several different yet related causes and effects - with several organisations from different sectors trying to solve things individually. With many organisations having limited resources, forming partnerships is a good approach to not only increase capability, but also your reach. Partnerships help build a common understanding, and harness the knowledge which might be spread across various different perspectives.

Format: Template

Timeframe: from several hours to 1-2 days

Group size: big group (not preliminary defined)

Facilitation level: medium

Level of expertise: high, more complex tool that should ideally be done over a few days. Given the strategic nature of the inputs/outputs, this needs consultations with seniors, peers and ideally needs to be revised after a first pass.

Required material: template (see Figure 1.12.1), pens, posters

Steps:

The Building Partnerships Map describes a series of phases which a partnership might involve. The map indicates what is needed in each phase to make such partnerships work, offering guidelines rather than rules. Each phase, as outlined on the worksheet, is important and should not be neglected if the partnership is to remain balanced and on course to achieve its goals. To work well, partnerships need to be mutually beneficial to the partners involved. You can use the Building Partnerships Map to analyse at what phase of partnership you and your partner are, so that you can move through the next phases to build a strong partnership together:

- Identify the stage that shows where you are at
- Identify the stage where you would like to be
- Use the template as a map to build a pathway towards that stage
- The mapped pathway gives an outline of the activities that need to be done in between.

Benefits/why to use this tool: With many organizations having limited resources, forming partnerships is a good approach to not only increase capability, but also your reach. Partnerships help build a common understanding, and harness the knowledge which might be spread across various different perspectives.

Remarques: Building partnerships takes a lot of effort from all those involved. They often take a considerable investment of time to build the high-quality working relationships that underpin effective collaboration. The Building Partnerships Map breaks the process into steps, so you can anticipate difficulties and challenges ahead.

How it looks like / template: see Figure 1.12.1.

Source/further reading:

Tennyson R. (2003) 12 Phases in the Partnering Process, p4. In: The Partnering Toolbook

https://diytoolkit.org/tools/building-partnerships-map-2/

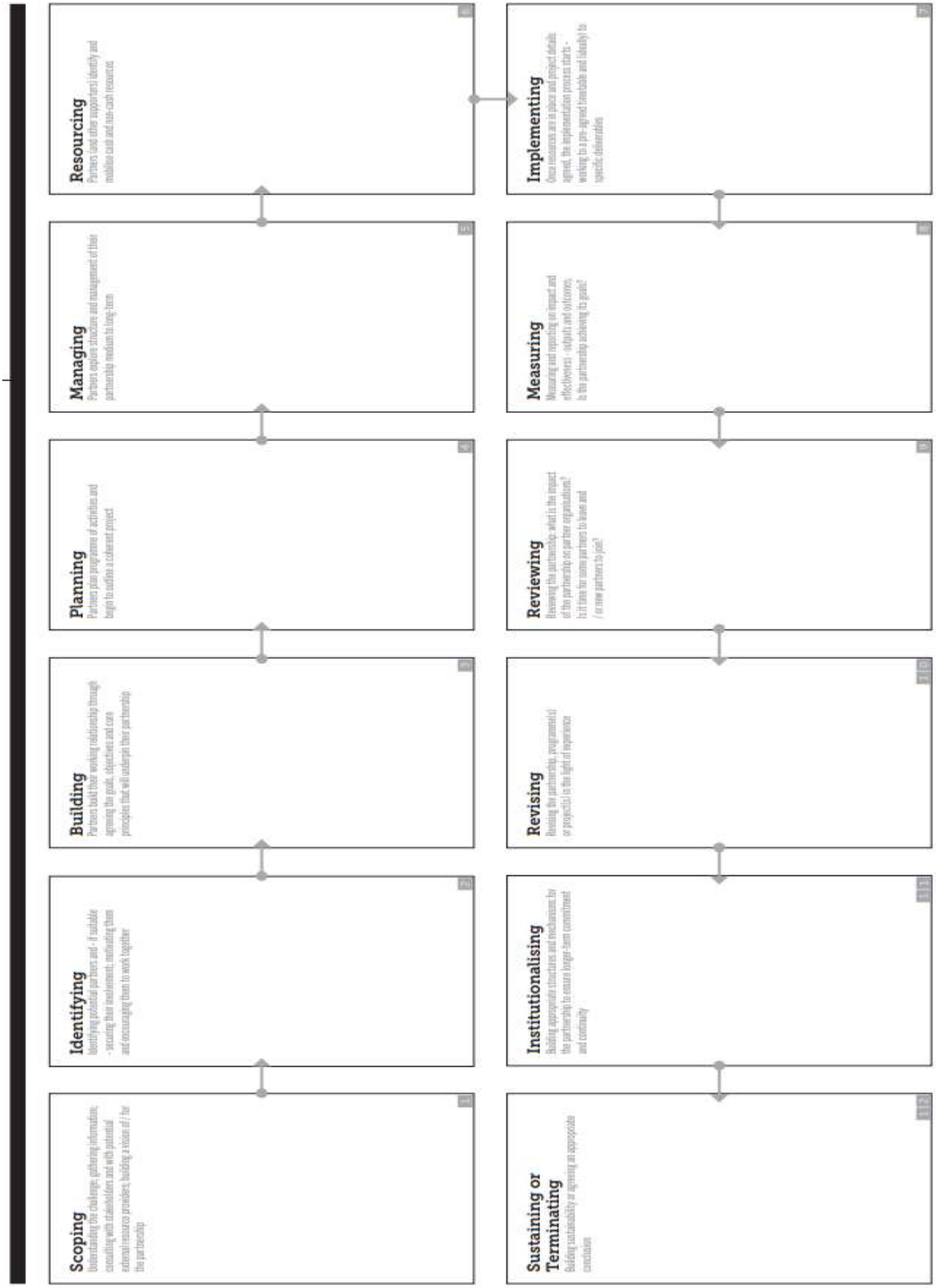


Figure 1.12.1. Building Partnerships Map template
Source: https://diytoolkit.org/tools/building-partnerships-map-2/

Tool 1.13. World café

Main goal: To collect and link ideas on a topic of mutual interest

Format: Workshop / Collaborative approach

Outcomes: Individual ideas into one comprehensive message

(Who?) Actors involved: Table hosts, participants

Group size: 12-36 people

Facilitation level: medium

Level of difficulty/Effort: middle

Time frame: 60-90 minutes

Required materials: Tables and 3-6 chairs at each table, items to create a relaxed/friendly atmosphere, paper, coloured pencils and markers.

Steps:

1. Setting – Create a special environment where people feel invited to contribute

2. Welcome and Introduction – Words of welcome and an introduction to the event by the host are necessary, setting the context, explaining the coffee etiquette and making the participants feel comfortable.

3. Small group rounds – The process begins with the first of three rounds lasting 20 minutes of small group conversation around a table. After the first 20 minutes, each group member moves to a different new table, and only the host of the table remains to welcome the next group. The table host should briefly explain what happened in the previous round using flipchart tablecloths as a visual reminder of the previous conversation.

4. Questions - Each round is preceded by a specific question created for the context and desired purpose of the session. The conversation is carried out around the questions, so its correct approach is key. The same questions can be used more than one round, or they can be built on top of one another to focus the conversation or guide its direction.

5. Harvest - After the small groups (and / or between rounds, as needed), participants are invited to share their opinion or other results of their discussions with the large group. These results are then often visually reflected using graphic recordings located in the front of the room.

Benefits / Why to use this tool: It is a simple, effective, and flexible methodology to carry out dialogues in large groups, promoting collaborative dialogue, sharing knowledge, and generating possibilities for group actions.

How it looks like/template: see Figures 1.13.1-1.13.2.

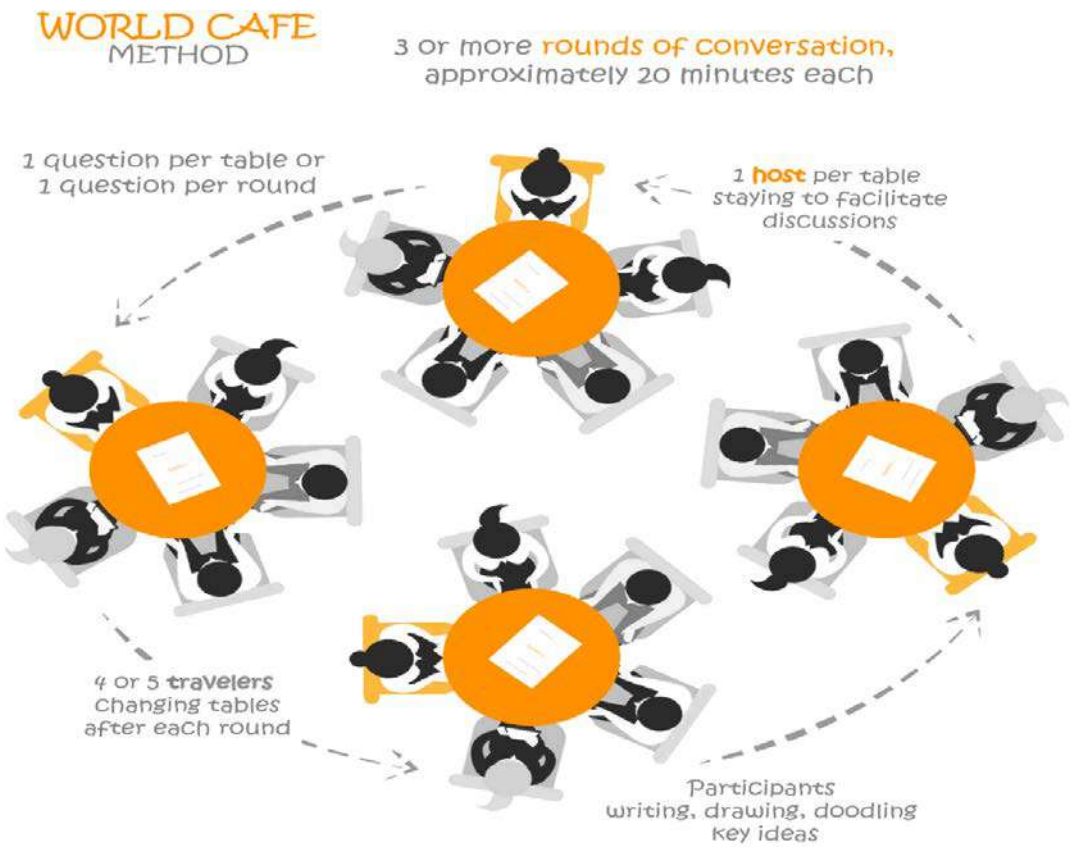


Figure 1.13.1. World café method

Source: https://urbact.eu/world-caf%C3%A9

Remarques/Notes: Small groups are a key aspect for the correct development of this method. Main principles of this techniques are presented in Fig. 43.

Figure 1.13.2. Main principles of world café

Source:https://www.acf.hhs.gov/sites/default/files/documents/ofa/hpog_world_cafe_paper.pdf

Source/further reading:

https://urbact.eu/world-caf%C3%A9
https://www.acf.hhs.gov/sites/default/files/documents/ofa/hpog_world_cafe_paper.pdf
https://edepot.wur.nl/409844
http://www.theworldcafe.com/key-concepts-resources/world-cafe-method/
http://www.mspguide.org/tool/world-cafe

Tool 1.14. Focus group

Main goal: to collect qualitative data related to a project's planning, implementation, and impact; to obtain data from a purposely selected group of individuals rather than from a statistically representative sample of a broader population. Focus group discussion is perceived to be a "cost-effective" and "promising alternative" in participatory research offering a platform for differing paradigms or worldviews.

Please note: Focus group discussion is sometimes seen as synonymous with interviews, especially the semi-structured "one-to-one" and "group interviews". Interviews involve a one-to-one, qualitative and in-depth discussion where the researcher adopts the role of an "investigator." This implies the researcher asks questions, controls the dynamics of the discussion, or engages in dialogue with a specific individual at a time. In contrast, in a focus group discussion, researchers adopt the role of a "facilitator" or a "moderator." In this setting, the researcher facilitates or moderates a group discussion between participants and not between the researcher and the participants. Unlike interviews, the researcher thereby takes a peripheral, rather than a centre-stage role in a focus group discussion.

Format: Workshop / Communication

Timeframe: 1 day

Group size: 3-12 people (up to 20)

Facilitation level: Medium

Level of difficulty/effort: middle

Required material: Facilitator, Scribers, recorder, Questions templates, Paper & pen, laptop

Benefits/why ti use this tool: Influence of group context, Variety of opinions, Depth of information, Useful for exploratory initiatives

Steps:

1) Decide who will participate
2) Define the topic and prepare the line of questions
3) Invite the focus group participants
4) Define the moderator who will encourage participants to discuss a particular topic.
5) Moderator starts with the general questions and go to the more specific, or focused, over time.
6) Moderator actively leads discussion around a particular issue. The moderator should be open and non-threatening, so that participants feel at ease, and are comfortable enough to express their opinions and discuss issues.
7) Analyse the collected information.

How it looks like/template: see Figure 1.14.1.

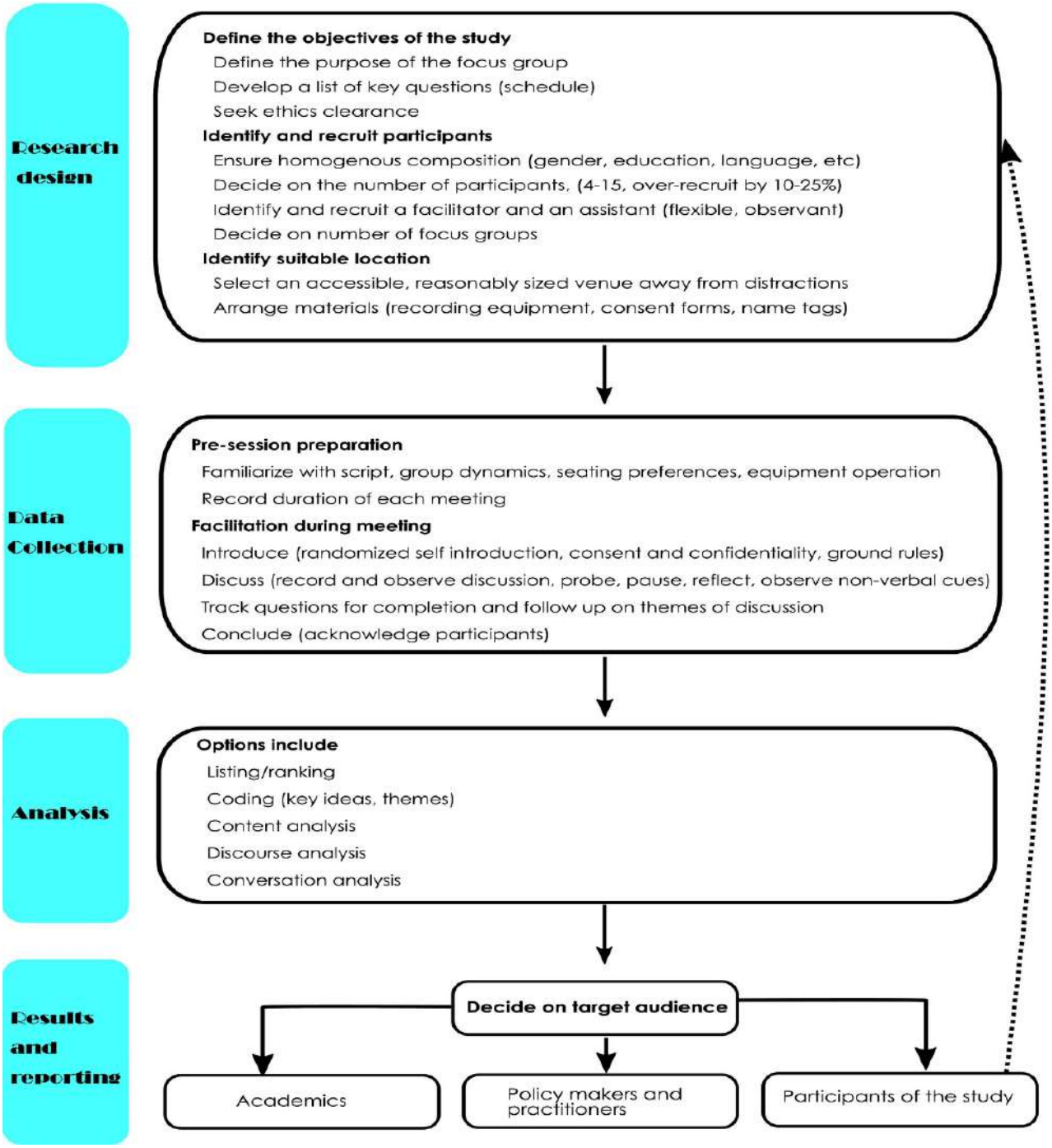


Figure 1.14.1. Flow chart of the steps of the focus group discussion technique

Source: Nyumba et al., 2018

Remarques/Notes: Even though the application of this method in research has been extensive, there are no critical assessment of the application of the technique. In addition, there are no readily available guidelines for researchers.

Our recommendation based on the literature and own experience:

a) *Provide a clear rationale for the choice of focus group discussion*: The researcher must be able to provide adequate justification for the choice of focus group discussion technique as the best suited to answering their questions about a phenomenon (Nyumba et al., 2018). A

clear rationale should provide the readers with confidence that the selection of data sources, the analysis and the interpretation is reliable and valid and that the quality of research is not compromised (Wilson, 2009).

b) *Focus on facilitator skills*: Focus group discussion relies on facilitators or moderators to guide the group's discussion (Morgan, 1996; Litosseliti, 2004); the facilitator must have a set of skills and techniques to ensure that the issues under discussion are addressed comprehensively. Here is a suggested skill set:

- Ability to build rapport by creating a warm, supportive and comfortable environment to foster open and honest dialogue among diverse groups and individuals.
- Have good and active listening skills to help engage with the respondent by paraphrasing or summarising their responses and using gestures to encourage conversation.
- Have good observation skills, pay attention to participants' body language or demeanour and recognise group dynamics.
- Have good speaking, communication skills and knowledge of the topic of discussion including some basic information on the subject to help in probing different answers for more in-depth discussion but should demonstrate some degree of "naïveté" to encourage participants' responses.
- Flexibility to adapt to the flow of the discussion, remain open to changes in the discussion guide, adjust to participants' requests during the group and adjust physical behaviours and activity around the room.
- Ability to remain impartial by getting involved while maintaining verbal and non-verbal objectivity.
- Should have a sense of humour to keep the discussion relaxed, encourage sharing of information and maintain a human connection.

c) *Beware of biases affecting group discussions*: Focus group discussion is a group-based technique. It is subject to the biases which are commonly encountered in any group setting. These include dominance effect (a dominant individual shape the discussion), halo effect (the perceived status of a group member influences the discussion), groupthink (the members in a group tend to think similarly to maintain group cohesion) among several others (Wilkinson, 1998). The facilitator should keep a keen eye out to spot and address such biases in the data collection phase.

d) Ensure a clear pathway between the data obtained, coding & subsequent data analysis.

Source/further reading:

Nyumba T.O., Wilson K., Derrick C.J., Mukherjee N. (2018) The use of focus group discussion methodology: Insights from two decades of application in conservation. Methods in ecology and evolution. https://doi.org/10.1111/2041-210X.12860

Wilson, L. H. (2009). Practical teaching: A guide to PTLLS & DTLLS. Boston, MA: Cengage Learning.

Morgan, D. L., Krueger, R. A., & King, J. A. (1998). The focus group kit (Vols. 1–6). Thousand Oaks, CA: Sage Publications Inc.

Litosseliti, L. (2004). Using focus groups in research. London, UK: Continuum.
Wilkinson, S. (1998). Focus group methodology: A review. International Journal of Social Research Methodology, 1, 181–203.

Tool 1.15. Sketch mapping

Main goal: To capture, visualize and record the knowledge of the local community about their physical environment through the visual representation of freehand drawings.

Format: Workshop + Template

Outcomes: Maps of the physical environment drawn by members of the community under study

(Who?) Actors involved: Facilitator(s), team members, local community

Group size: not preliminary defined

Facilitation level: middle

Level of difficulty/Effort: Low effort/easy to use

Time frame: from several hours to several days

Required materials: Sheets of paper, coloured pens, pencils

Steps: -

Benefits/ Why to use this tool: This tool makes it possible to transmit local knowledge and personal perceptions of space in an easy and simple way to understand for a diverse set of stakeholders and outsiders. These sketches provide relevant information for the realization of the project because show a representation of the spatial elements and issues to which the participants assign a specific relevance.

How it looks like/template: see Figure 1.15.1.

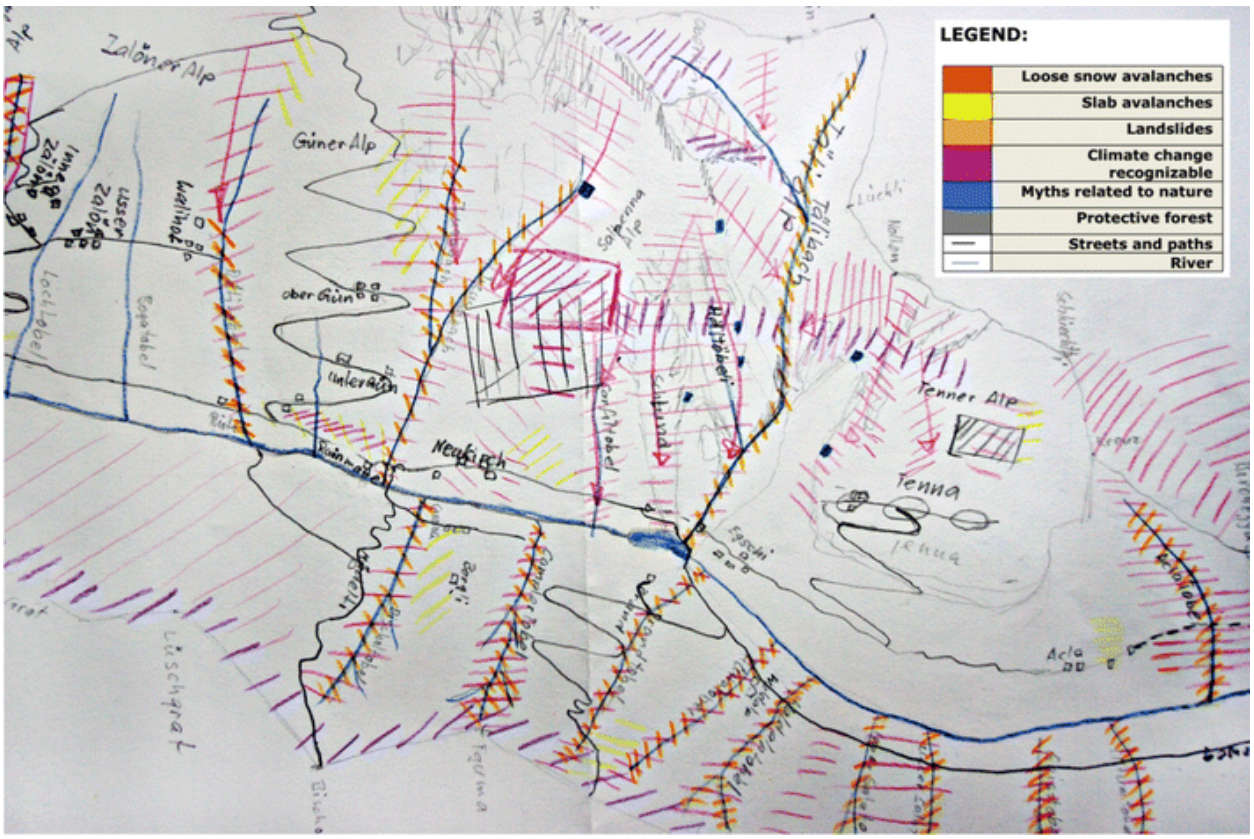


Figure 1.15.1. Example of a sketch map
Source: Reichel and Frömming, 2014

Remarques/Notes: Sketch mapping can be easily combined with other stakeholder-engagement tools. This tool is especially useful for understanding indigenous communities.

Source/further reading:

Reichel, C., Frömming, U.U. Participatory Mapping of Local Disaster Risk Reduction Knowledge: An Example from Switzerland. Int J Disaster Risk Sci 5, 41–54 (2014). https://doi.org/10.1007/s13753-014-0013-6
https://phusicos.eu/wp-content/uploads/2019/04/PHUSICOS_D3_2r_WP3_final_20190331.pdf
https://link.springer.com/article/10.1007%2Fs13753-014-0013-6
https://www.ifad.org/documents/38714170/39144386/PM_web.pdf/7c1eda69-8205-4c31-8912-3c25d6f90055

Tool 1.16. Future searching conference

Main goal: Identify a shared vision of the future towards which to aim

Format: Multidisciplinary workshop

Outcomes: Meeting between people, creation of alliances and shared projects

(Who?) Actors involved: Designer(s), Stakeholders, selected participants, organizations and community representatives, experts, among others.

Group size: 60-80 people

Facilitation level: advanced

Level of expertise/Effort: High

Timeframe: 3 days

Required materials: A big room, tables, chairs, notepads, giant sheets of paper, colored pens and markers

Steps:

1. Focus on the Past – Participants begin exploring their shared past answering some questions. When they have conflicting points of view, they are simply noticed, and participants should return their attention to their commonalities as quickly as possible.

2. Focus on Present & External Trends – Participants discuss exploring global trends and forces that affect their daily lives. Create a "mind map" by incorporating these trends onto a giant sheet of paper. Throughout the discussion, they should prioritize the trends they have identified and explore common ways of looking at the mess they have made together.

3. Focus on the Future – The stakeholders then meet in subgroups to imagine themselves in future scenarios for 5, 10, and 20 years. They must generate concrete images and examples of what is happening in the chosen future and the barriers they imagine they have had to overcome to get there. After meeting to share this information, participants develop lists of common futures (what they agree they want), potential projects (how to get there), and unresolved differences. After a moment to reflect and think, each participant discovers what they want to work on personally. Finally, they meet with others of similar passion to plan next steps and actions.

Benefits/Why to use this tool: This tool is useful to provide the opportunity to develop an agreed action plan between those who have power over the issue (i.e. authorities, politicians or project designers) and those who will be affected or have concerns regarding the issue (i.e. local citizens, farmers, etc.).

How it looks like/template: -

Remarques/Notes: -

Source/further reading:

https://www.betterevaluation.org/en/evaluation-options/future_search_conference

https://www.plays-in-business.com/future-search/

https://www.involve.org.uk/resources/methods/future-search

http://www.sellnow.de/docs/Sellnow%20future%20search%20conference.pdf

Sub-cluster 2: Tools to test and validate NBS

Tool 2.1. Prototype testing plan

Main goal: Structure how to efficiently proceed to fine-tune a solution or approach before implementing it or making a large investment in it. Building a prototype helps you model and test your idea, incorporating feedback and details that will allow its successful implementation considering users' needs and expectations.

Format: Template and workshop

Outcomes: preliminary model of the solution, collected feedback, the updated plan for activities

(Who?) Actors involved: team members, potentially other stakeholders

Group size: 1-2 to 10-15

Facilitation level: medium

Level of expertise/Effort: middle

Time frame: 1-2 h

Required materials: "Prototype testing plan" worksheet, paper, pens, or other graphic materials to represent ideas.

Steps:

1. Specify the main hypothesis/idea that you want to test

2. Try your idea: Build a small model of your idea using cardboard / paper or other materials to visualize its realization in three dimensions to see its feasibility and possible gaps. Pretend the idea is introduced in front of your target audience and identify potential gaps. Draw your experience and use Experience Maps to communicate it to your audience in the form of a story.

3. Test your idea again after updating to examine the details before launching: With the updated idea you can check new details and items. These changes must be verified in their synchronization and coincidence. It is also appropriate to draw the experience to create a story that can later be communicated.

4. Make a list of all the requirements you need to carry out your idea. This step considers the specification of activities, resources, people and materials necessary for the implementation.

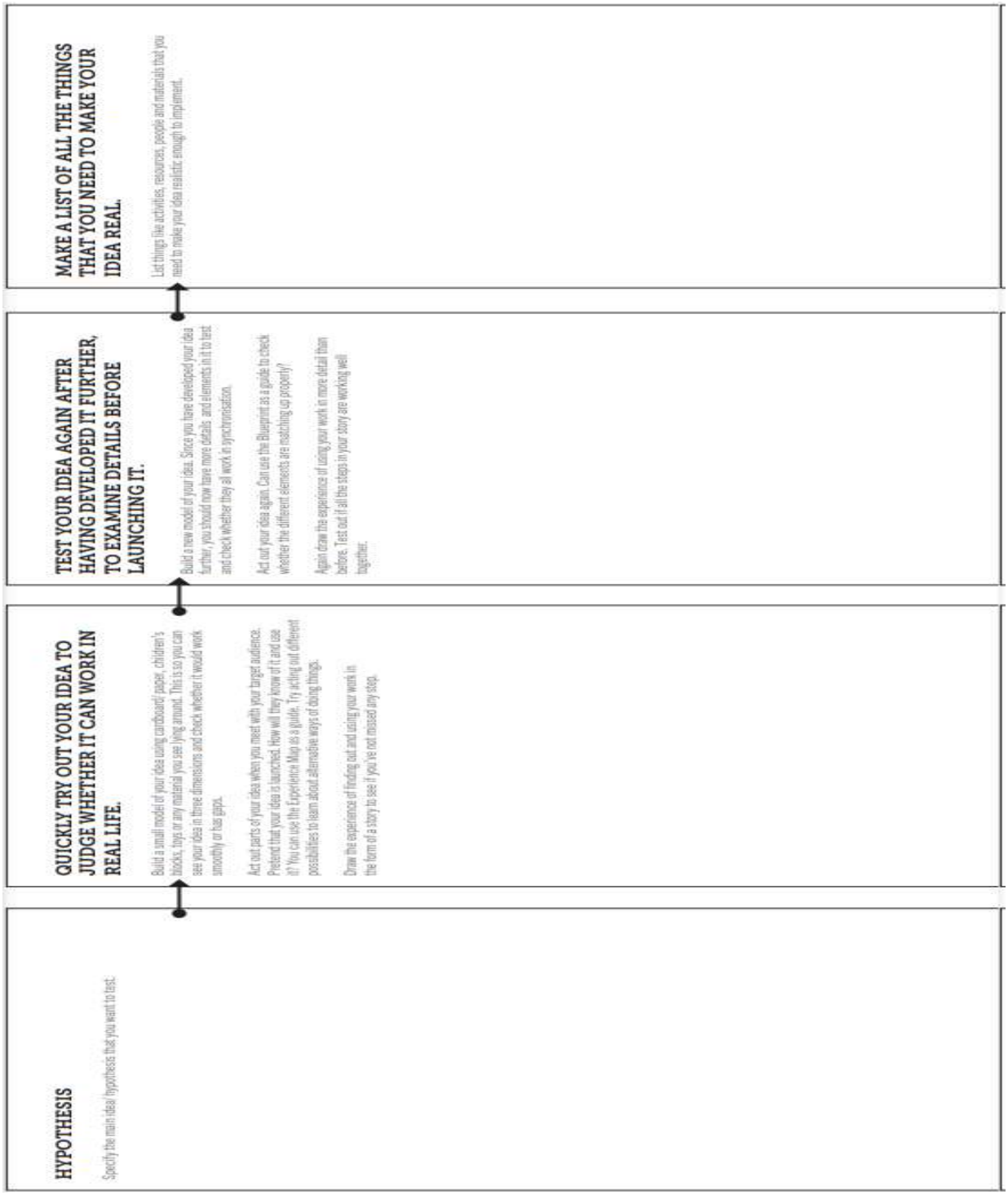
Benefits/Why to use this tool: It provides a useful overview of the different ways you can test your work and the particular moment in which you can do it. Building a prototype using materials or simply drawing or putting your idea into practice allows you to improve your work while avoiding getting lost once the feedback you collect begins to accumulate.

How it looks like/template: see Figures 2.1.1 a-b.

Remarques/Notes: The key is to be easy and inexpensive to build, focusing more on the core offering rather than a smooth finish.

Source/further reading:
https://diytoolkit.org/tools/prototype-testing-plan/?cn-reloaded=1
https://diytoolkit.org/media/Prototype-Testing-Plan-Size-A4.pdf
https://vimeo.com/101635710
https://www.nesta.org.uk/toolkit/prototype-testing-plan/
https://maze.co/blog/prototype-testing/

a



b

Figure 2.1.1. Example of content (a) and template (b) of Prototype testing plan

Source: https://www.nesta.org.uk/toolkit/prototype-testing-plan/

Tool 2.2. Live prototyping

Main goal: Though you've been getting feedback from the people you're designing for all along; a Live Prototype gives you a chance to stress test your complete solution in real world conditions. It can run from a few weeks to a few months, and it might be the first time that you observe how all parts of your solution work together as one system. Live Prototypes are all about understanding the feasibility and viability of your solution so that you can optimize it further.

Format: Template

Outcomes: understanding of the feasibility and viability of your solution so that you can optimize it further.

(Who?) Actors involved: Design Team, Key Partners, Additional Staff

Group size: not preliminary defined

Facilitation level: medium

Level of expertise/Effort: Hard

Time frame: A few weeks to a few months

Required materials: Space, staff, permits, or whatever it takes to run your solution in real market conditions

Steps:

1. The first step is to determine what it is you want to learn in your Live Prototype. What outstanding questions have you got about how your solution will reach its audience? What do you need to validate about its feasibility or effectiveness? You will like have surfaced a number of these unknowns during your Theory of Change activity.
2. Once you've decided on your learning goals you're ready to determine the scope of your live prototype. How long does it need to run for to get the data you need? In how many locations should you test? As a general rule of thumb, smaller is better in a live prototype as you'll most certainly need to iterate on your solution afterwards.
3. Check out the Monitor and Evaluate activity to help you identify key indicators and data collection tools you will need. Consider the logistics of your Live Prototype too. Do you need a physical space, additional staff, uniforms, a permit, or anything else?
4. If you have the capacity, think about running a few Live Prototypes at once. This will allow you to test variations on your solution quickly.
5. Keep Iterating. If something went wrong on Day 1, try a new approach on Day 2. Live Prototypes are all about learning quickly, iterating on the fly, and pushing your solution closer and closer to the real thing. This will fast-track your progress to an impactful solution that is ready for next level testing in a Pilot.

Benefits/Why to use this tool: A Live Prototype is a chance to run your solution for a few weeks or months out in the real world.

How it looks like / template: see Figure 2.2.1.

A GUIDE TO PROTOTYPING

	RAPID PROTOTYPING	LIVE PROTOTYPING	TECHNICAL PROTOTYPING	PILOT
Question answered	What are the different ways we could solve this problem?	Does our message and solution resonate in the market?	Can the problem be solved in this specific way?	Are the economics attractive enough to justify scaling?
When to employ it in the product-development process	Early, to explore many ways to achieve a goal and periodically during the mid-phase to explore ways to deliver a specific feature or value driver.	Midway, to rigorously explore market appeal once a specific opportunity area has been identified.	When technical feasibility is in question or when the function has been identified but the specific means is yet to be determined.	Late, as a final check to tweak details before launching at scale.
Fidelity (i.e. the degree to which a prototype reflects a polished and finished product)	Low	Just enough for the product to appear real in the marketplace.	High enough to prove feasibility.	Very high. Pilots require a working solution and are often more polished than the scalable versions to overcome initial market awareness challenges.

SOURCE DAVID AYCAN AND PAOLO LORENZONI HBR.ORG

Figure 2.2.1. Example of Live prototyping

Source: https://hbr.org/resources/images/article_assets/2014/03/a-guide-to-prototyping2.gif

Remarques/Notes:

Live prototyping has advantages -and disadvantages, which you should understand before you add it to your product-development toolkit. Among its *advantages*, live prototyping:

Conserves capital: By “cutting corners” relative to a full pilot, we can evaluate market appeal without the capital investment that a pilot requires. Usually, we can do several iterations of live prototyping for the price of a single pilot.

Considers context: Since live prototyping occurs in context, it helps generate an understanding of how environmental and situational factors affect the appeal or visibility of a solution. In this way, live prototyping allows us to observe what people do, not just what they say they’ll do.

Improves forecasting: Forecasting sales for new-to-the-world solutions is exceedingly difficult and predicting consumer uptake is often the most arbitrary part of the exercise. Seeing a solution succeed next to the competition, before it is formally launched can make forecasting much less of a guessing game.

Provides qualitative and quantitative feedback: Live prototyping allows us to capture many different types of feedback, including consumer behavior data, rich qualitative observations and insights from consumer interviews, which help us unpack choices and behavior. Taken in aggregate, this basket of feedback allows us to better iterate our solutions.

Live prototyping has three main areas of *disadvantage*:

Longitudinal feedback: Since live prototyping usually addresses the resonance of a value proposition in context, we generally invest more on the fidelity of initial packaging and associated marketing materials, and less on the features that deliver value over time. Hence, it is usually more difficult to use live prototyping to evaluate retention and engagement over time.

While we have done this in the past, the effort to do so gets close to that of a pilot, and so the speed benefits of live prototyping are not as easily realized.

Exploring broad options: Since it takes significant effort to build a channel-specific solution during live prototyping—arranging testing locations, building displays, for example—it can be challenging to explore a diverse set of concepts. For example, live prototyping can work well to test a number of different food brand options, even across different retailers, but if some concepts require completely different channels, for example vending machines, then the process becomes unwieldy.

Cultural norms: While American consumers have shown a hunger to co-create solutions with companies and tend to celebrate brands that embrace experimentation and that are ”always in beta”, this is not always true in global markets. It’s important to calibrate what degree of “roughness” is going to be acceptable based on the market in which you’re operating.

Source/further reading:

Aycan D., Lorenzoni P. (2014) The Future of Prototyping Is Now Live. Harvard Business Review. https://hbr.org/2014/03/the-future-of-prototyping-is-now-live

https://uxplanet.org/prototype-with-live-data-get-better-results-292f9fa91b38

Tool 2.3. Usability testing

Main goal: Usability testing is a popular research methodology. In a session, a researcher asks a participant to perform tasks, usually within a specific product or service. While the participant completes each task, the researcher observes the participant's behaviour and listens for feedback.

In a usability-testing session, a researcher (called a "facilitator" or a "moderator") asks a participant to perform tasks, usually using one or more specific user interfaces. While the participant completes each task, the researcher observes the participant's behaviour and listens for feedback.

Format: Template and workshop

Outcomes: uncovered problems and opportunities in designs.

(Who?) Actors involved: team members and stakeholders

Group size: 1-2 team members and 5 stakeholders

Facilitation level: advanced

Level of expertise/Effort: high

Time frame: 3 days

Required materials: usability testing templates, pens, laptops

Steps:

- Day 1: Plan the study
- Day 2: Test the 5 users
- Day 3: Analyse the findings and convert them into redesign recommendations for the next iteration

A usability-testing session involves a participant and a facilitator who gives tasks to the participant and observes the participant's behaviour.

The facilitator administers tasks to the participant. As the participant performs these tasks, the facilitator observes the participant's behavior and listens for feedback. The facilitator may also ask followup questions to elicit detail from the participant. In a usability test, the facilitator gives instructions and task scenarios to the participant. The participant provides behavioral and verbal feedback about the interface while he performs those tasks.

Benefits / Why to use this tool:

- Identified problems in the design of the product or service
- Discovered opportunities to improve
- Learning about the target user's behaviour and preferences

How it looks like / template: see Figure 2.3.1.

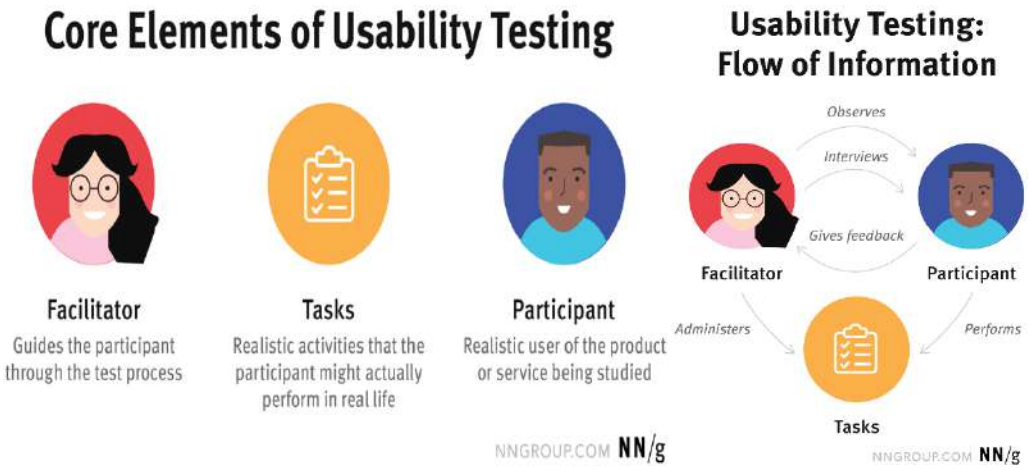


Figure 2.3.1. Example of usability testing and its core elements
Source: https://www.nngroup.com/articles/usability-testing-101/

Remarques/Notes: -

Source/further reading:

https://www.nngroup.com/articles/usability-testing-101/

User Testing: Why & How (Video) https://www.nngroup.com/videos/user-testing-jakob-nielsen/

How to Conduct Usability Studies (Report) https://www.nngroup.com/reports/how-to-conduct-usability-studies/

Tool 2.4. Assumption mapper / mapping

Main goal: Identify and prioritize your key assumptions (or hypothesis) about desirability, viability, and feasibility in terms of importance and evidence.

Format: Workshop / Collaborative activity

Outcomes: Assumption's mapping and overview on team priorities

(Who?) Actors involved: Facilitator(s) and participants

Group size: not preliminary defined

Facilitation level: medium

Level of expertise/Effort: medium

Time frame: 60 minutes

Required materials: Paper, pens/markers

Steps:

1. Each participant write down 4-6 key assumptions about desirability, viability, and feasibility

2. Share your assumptions and build on each other's assumptions

3. Identify which assumptions are critical by asking yourself "if these assumptions were invalidated, would it kill our project?". Thus, focus on the critical assumptions and identify which ones would be easy or difficult to test.

4. Agree with the team on which assumptions you will test first based on your assumption map

Benefits/Why to use this tool: The assumptions made are assessed to understand the risk and uncertainty of your ideas, thus identifying four types of assumptions that can help design a starting route to proceed building the right product.

How it looks like/template: see Figure 2.4.1.

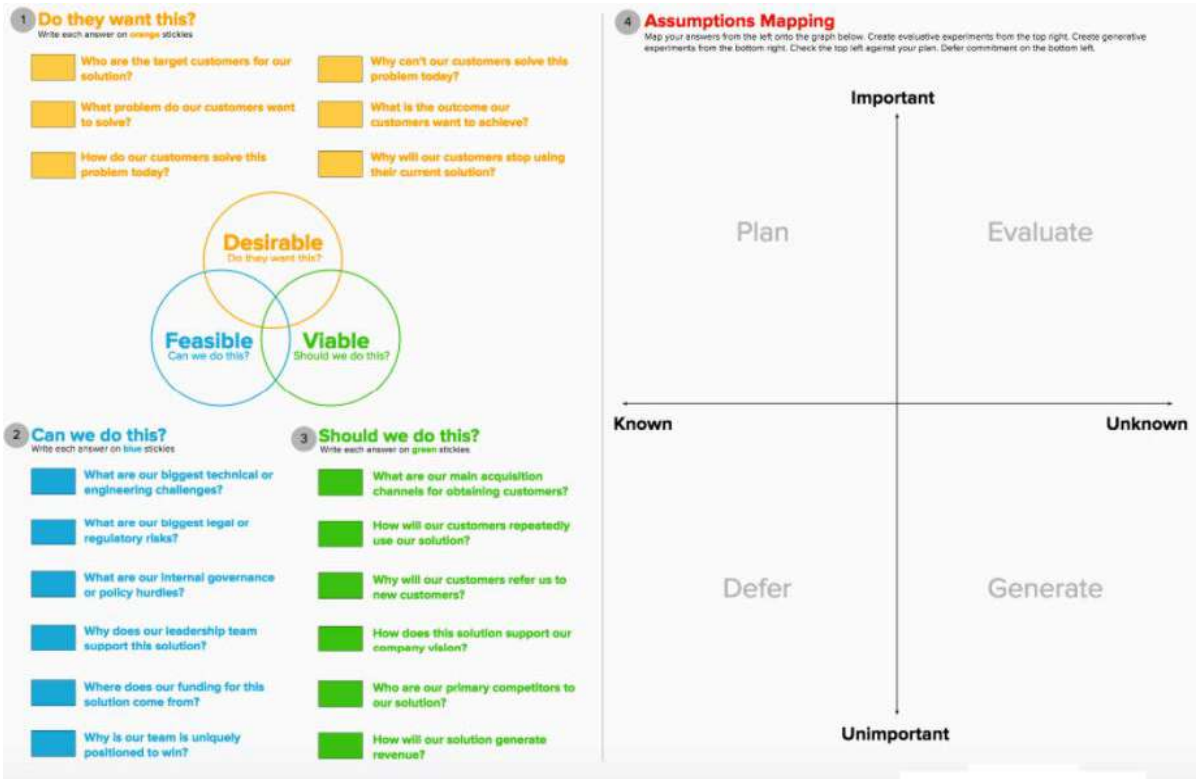


Figure 2.4.1. Example of Assumption mapping

Source: https://medium.com/@i.shubhangich/assumption-mapping-5584a7491d9c

Remarques/Notes: -

Source/further reading:

https://masteringbusinessanalysis.com/mba099-assumptions-mapping/

https://www.strategyzer.com/blog/how-assumptions-mapping-can-focus-your-teams-on-running-experiments-that-matter

https://www.mural.co/blog/intro-assumptions-mapping

https://www.boardofinnovation.com/tools/assumption-mapper/

https://medium.com/@i.shubhangich/assumption-mapping-5584a7491d9c

Tool 2.5. Blink testing / 5 seconds-blink testing

Main goal: Determine what visual elements are most prominent within the blink of an eye

Format: Workshop

Outcomes: a series of impressions about the solution which should help to improve the design and defined next steps of activities

(Who?) Actors involved: Designer(s), facilitator(s), team members, all stakeholders

Group size: Variable

Facilitation level: beginner

Level of expertise/Effort: easy

Time frame: Variable

Required materials: Variable – Paper, pens, visual tools, dashboards, etc.

Steps:

1. Determine the type of 5-second blink test you want to perform.

2. Create your test: If it is manually you show a page for five seconds and then take it away

3. Customers take your test and return in the results

4. Analyse the results and look for patters

Three suggested ways:

1. Free-listening technique: Stakeholders write everything they can remember into a list after seeing your page for 5-seconds

i) Provide two pens and paper

ii) Use one idea per line

iii) Tell customers to write as long as they want (no time limit)

iv) Tell them to work alone (to register person's impressions)

2. Drawing technique: Stakeholders draw what they remember

i) Provide two pens and paper (do not use coloured markers)

ii) Instruct users to roughly sketch

iii) Tell customers to draw as long as they want (no time limit)

3. Question & answer technique: Set of questions that customers can answer after showing them a page for 5 seconds.

i) Ask 3.4 questions (people forget quickly)

ii) Split questions if you have several

iii) Provide pens and paper

iv) Be prepared with additional papers if they write multiple paragraphs (no time limit)

Benefits/Why to use this tool: The knowledge of the 5-second blink test allows to know the initial impressions of the end users before starting to work with the product. The Blink Test hinges

on the fact that impressions of your solution (and therefore your brand) are determined within a matter of seconds which save your time and provide valuable insights.

How it looks like/template: -

Remarques/Notes: -

Source/further reading:

https://www.linkedin.com/pulse/3-ways-perform-blink-testing-brian-sullivan/

https://www.satisfice.com/blog/archives/33

https://www.blinkjarmedia.com/blog/inbound-marketing-baton-rouge/bid/121491/the-blink-test

Tool 2.6. A/B tests

Main goal: To compare two versions of a variable (e.g. NBS with traditional solutions, or several scenarios) by testing a subject's response to variant A against variant B and determining which one is the most effective.

Format: Workshop and visualization (template)

Outcomes: Results of user preferences between two options

(Who?) Actors involved: Designer, stakeholders

Group size: not preliminary defined

Facilitation level: beginner

Level of expertise/Effort: easy

Timeframe: 1-2 h

Required materials: Online platform or physical materials that allow making choices

Steps:

1. Identify a specific problem

2. Analyze your data – You must generate an analysis of the specific elements that could affect your campaign. These elements can provide evidence that users are confronted with your product (for example, the channels used).

3. Develop a hypothesis – Narrow your unknown to one or two specific variables that you would like to test.

4. Apply an A/B test – Develop a new version of your idea and test it with your previous version.

5. Analyze the received data – consider the conversion rates or any other results you expected, find out through the test and see if you can notice any substantial changes. If you do not notice changes you have to repeat the whole cycle or try and test another element.

6. Determine which version most influenced your success metric.

Benefits/Why to use this tool: Testing different variables and changes is important to know how effective your changes are or what has essentially caused the difference in the result. Additionally, A/B testing is used in user experience research and marketing campaigns that deliver long-term benefits.

How it looks like/template: see Figure 2.6.1.

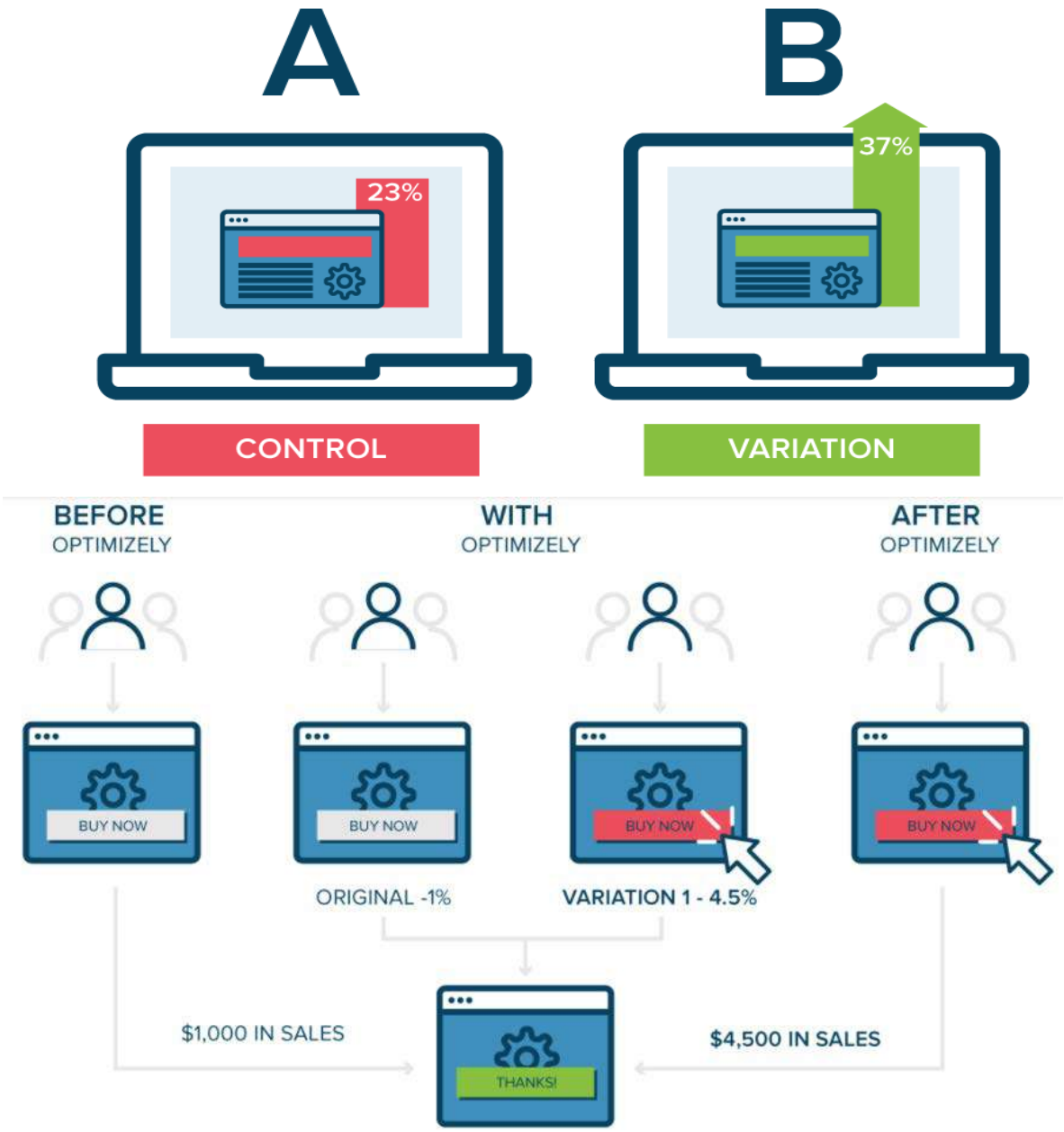


Figure 2.6.1. Examples of A/B tests

Source: https://www.optimizely.com/optimization-glossary/ab-testing/

Remarques/Notes: Questions to visitors should avoid being confusing and should not interrupt the development of the activity; provide clear information, highlight customer reviews, and write simple content.

Source/further reading:

https://www.optimizely.com/optimization-glossary/ab-testing/

https://vwo.com/ab-testing/

https://hbr.org/2017/06/a-refresher-on-ab-testing

https://soshace.com/ab-testing-resources/

Tool 2.7. Story boarding / story wall

Goal: to provide an opportunity to a stakeholder group to collectively look back and reflect upon a jointly experienced process, progress and key events, enabling to make transparent even contrasting perspectives and perceptions.

Format: Workshop & Visualization

Timeframe: 1 hour + 1,5 hour

Group size: 3-50 people

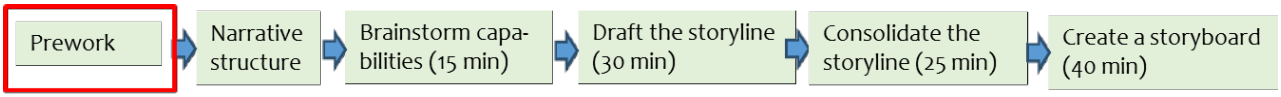
Group: broad range of actors from all sectors and levels

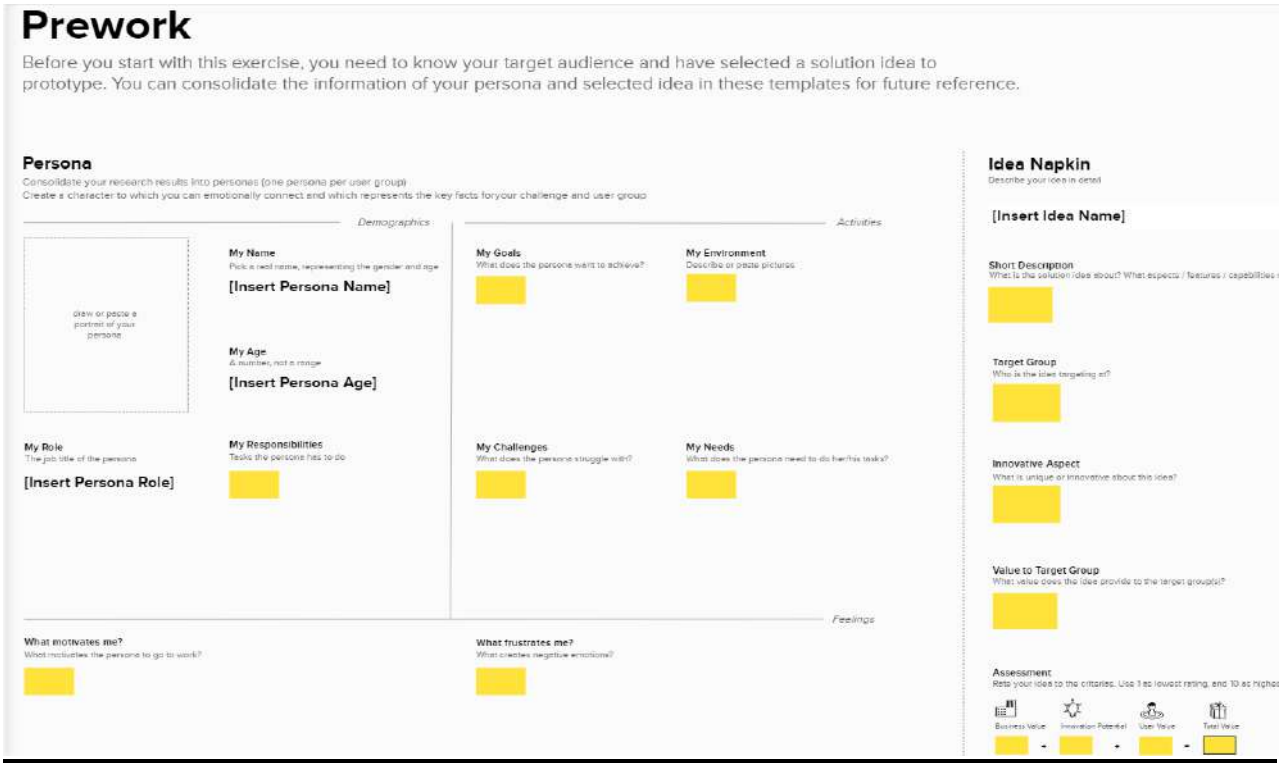
Facilitation level: beginner

Level of expertise/Effort: easy to apply

Required material: Paper, Posters, a table, a few flipcharts, other big sheets of paper or whiteboards and markers (different colours) are required.

Steps: as suggested by Mural (see Figures 2.7.1-2.7.2 and the link below)





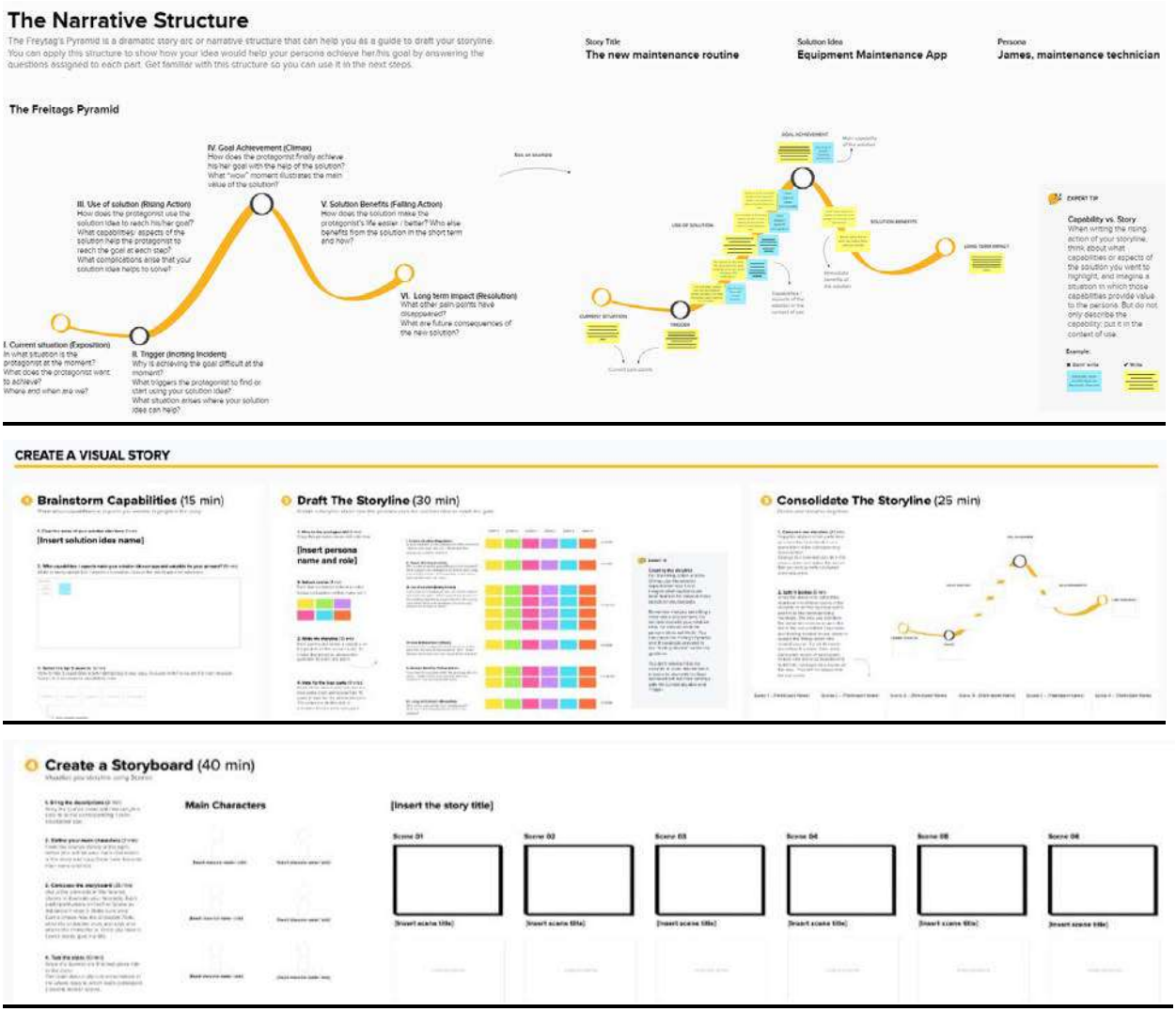


Figure 2.7.1. Steps foreseen for the activities within the Storyboard technique
Source: https://www.mural.co/templates/vision-storyboard

Benefits / Why to use this tool:

- Diverse stakeholders represent diverse perspectives.
- a low-budget and simple tool
- It allows **to explore opinions and worldviews, foster group cooperation and measure NBS efficiency**
- **jointly mark important events and turning points in the order they occurred, thereby outlining a "joint story".**

Remarque/Note: In complex settings or contested terrain, an experienced facilitator or supporting coach might be recommendable to steer the tool process towards achieving its positive effects

Template/how it looks like: see Fig. 64.

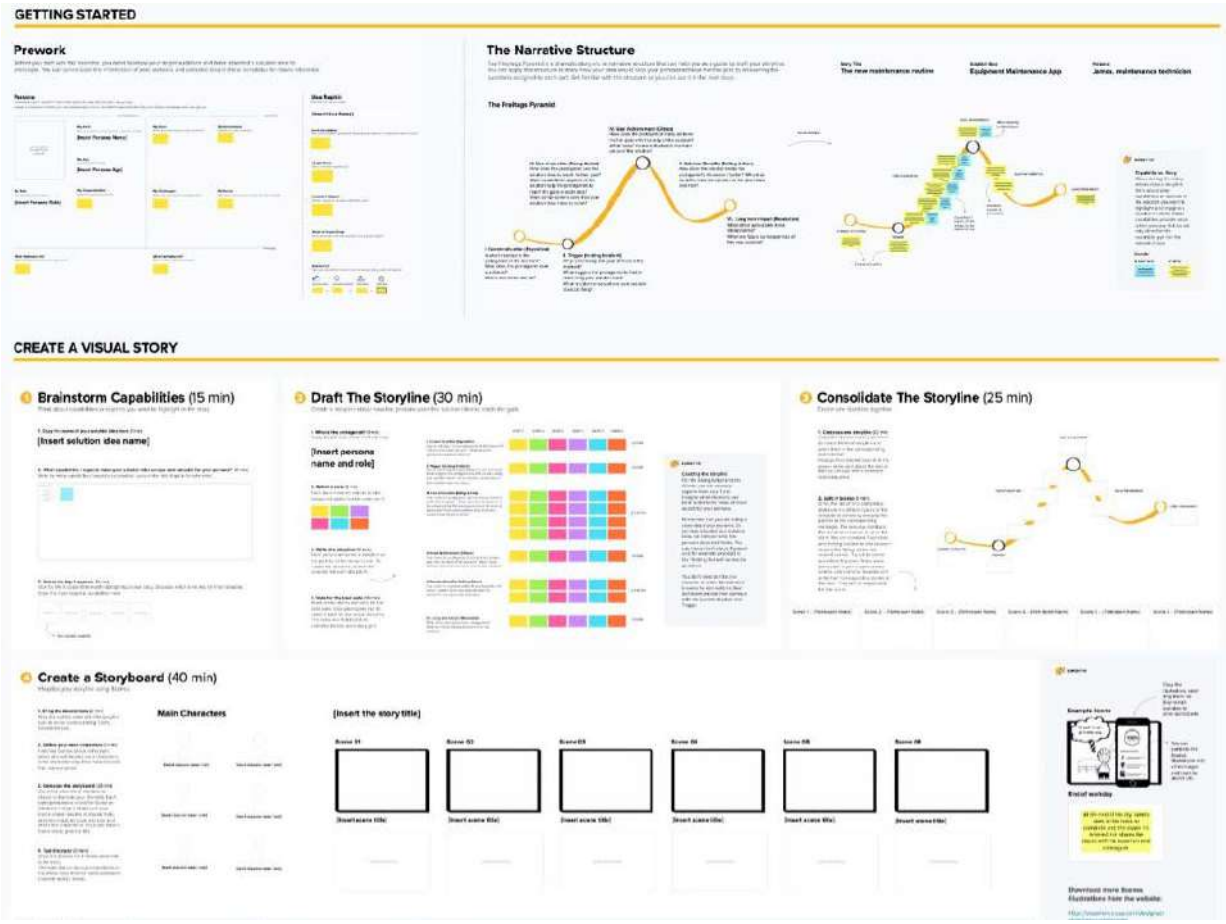


Figure 2.7.2. Example of Storyboard

Source: https://www.mural.co/templates/vision-storyboard

Sources/further reading:

https://www.mural.co/templates/vision-storyboard

https://www.vyond.com/resources/what-is-a-storyboard-and-why-do-you-need-one/

https://www.mindtools.com/pages/article/newTMC_77.htm

Tool 2.8. Story world

Main goal: to compile life stories of people related to the project, analysing the complexity of their realities and designing solutions aimed at them.

Format: Template and workshop

(Who?) Actors involved: Facilitator, team members, stakeholders

Outcomes: New ideas and solutions from complete Story world worksheets

Group size: not preliminary defined

Facilitation level: medium

Level of expertise /**Effort**: middle effort

Timeframe: -

Required materials: Story world worksheets, pens, markers

Steps:

1. Bring the team or people involved in the project together.
2. Begin filling out the sections together with the participants.
3. Develop a joint understanding of a person and his or her world.
4. Identify different aspects of themselves and their lives as part of your conversation.
5. Collect and organize the results.

Benefits/Why to use this tool: This tool allows to collect qualitative data from a group of participants from which it is possible to document insights and structure the documentation for the following discussions. Thus, these stories can be a key trigger to inspire creative ideas.

How it looks like/template: see Figure 2.8.1.

Figure 2.8.1. Example of Story World template
Source: https://diytoolkit.org/tools/storyworld/

Remarques/Notes: Story world tool is used as input for creative workshops

Source/further reading:
https://diytoolkit.org/tools/storyworld/

Tool 2.9. Learning loop

Main goal: Help to understand the different phases involved when trying to implement your ideas, therefore helping to understand what to do next.

Format: Template

Outcomes: Learnings from the team members

(Who?) Actors involved: Facilitator, team members

Group size: not preliminary defined

Facilitation level: beginner

Level of expertise/Effort: easy

Time frame: not preliminary defined

Required materials: Learning Loop worksheet, pens

Steps: There is no strict beginning or end to this process, just use the Learning Loop worksheet to take notes in each of the four quadrants, collecting stories, feedback or results that will provide learnings to consider and improve next steps in the process.

Benefits/Why to use this tool: It provides a high-level perspective on how the implementation of social change can be divided into a gradual process of iterative learning cycles allowing to verify if the organization is learning from its experiences and is continuously improving.

Template/How it looks like/template: see Figure 2.9.1.

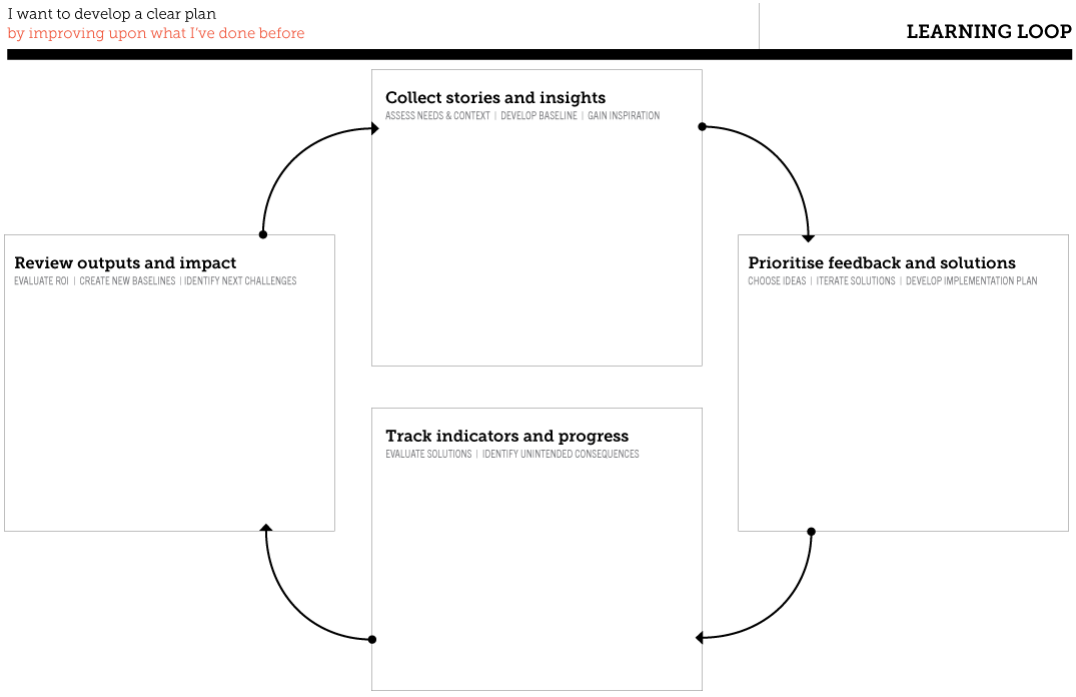


Figure 2.9.1. Example of learning loop
Source: https://diytoolkit.org/tools/learning-loop/

Remarques/Notes: -

Source/further reading:

https://diytoolkit.org/tools/learning-loop/

Tool 2.10. Improvement triggers

Main goal: To generate new ideas for a new product / service from what already exists using different perspectives.

Format: Template

Outcomes: Worksheet with ideas that could improve the work areas.

(Who?) Actors involved: Facilitator, team members

Group size: not preliminary defined

Facilitation level: beginner

Level of expertise/Effort: easy

Timeframe: not preliminary defined

Required materials: template (see below), pen

Steps: Each of the questions on the worksheet should give a different perspective on their work. Through short answers, you should generate a concise description of how your work is different and how you could improve it.

* The questions in this worksheet are only examples, many other questions may also be relevant. The key is to use the seven categories of questions to provoke your thoughts on possible improvements.

Benefits/Why to use this tool: It helps to make the work stronger focusing on the areas where lots of competing solutions are already available.

Remarques/Notes: -

How it looks like/template: Worksheet – see Figures 2.10.1-2.10.2.

Figure 2.10.1. Example of Improvement triggers

Source: https://diytoolkit.org/media/Improvement-Triggers-Size-A4.pdf

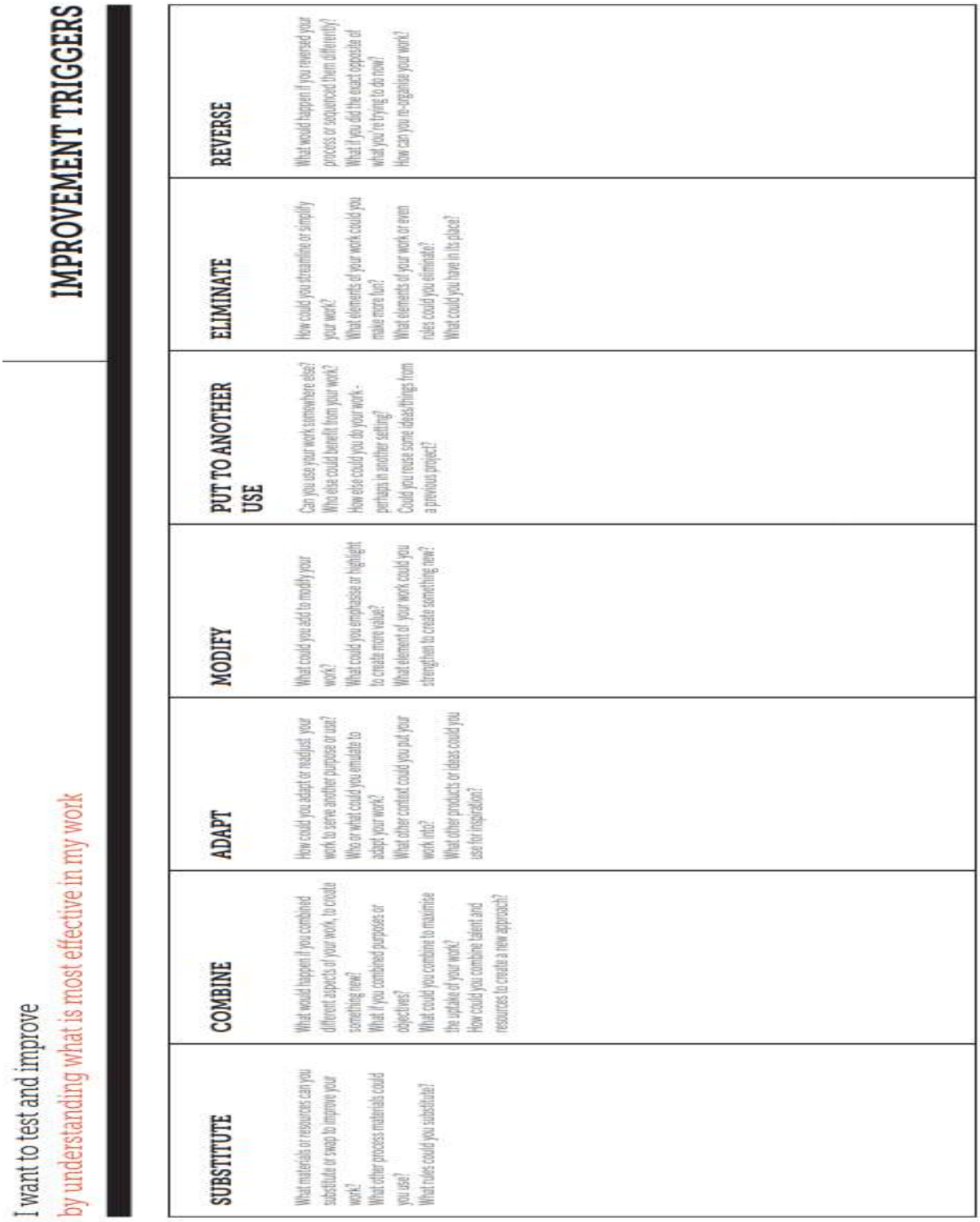


Figure 2.10.2. Example of Improvement triggers templates
Source: https://diytoolkit.org/media/Improvement-Triggers-Size-A4.pdf

Source/further reading:
https://diytoolkit.org/media/Improvement-Triggers-Size-A4.pdf
https://antreem.com/en/tool/improvement

Tool: Service blueprint

See Tool 1.9 Service blueprint

Sub-cluster 3: Tools to support decision and evaluate the user's reactions to the NBS

Tool 3.1. Open nature innovation arena (Co-creation Arena)

Main goal: To connect public authorities and citizens to address a specific problem through the co-creation of NBS.

Format: Template + Workshops

Outcomes: Citizen proposals to implement NBS to address specific problems through co-creation.

(Who?) Actors involved: Facilitator(s), IT department members (website designer), municipality employee (s), participating citizens, project managers, experts.

Group size: 1-2 people

Facilitation level: medium

Level of expertise/Effort: Middle effort

Time frame: 15 minutes

Required materials: Smart devise, internet connection, user guide.

Steps:

1. The citizens start the co-creation activities creating a problem through Open Nature Innovation Arena (ONIA), accessed with the link http://onia.unalab.en.it/

2. The municipality considers the problem and creates a challenge to stimulate citizen participation. In addition, the municipality indicates the criteria for evaluating the challenge to maintain the transparency of the process.

3. Several citizens participate in the challenge presenting possible ideas for solutions. If possible, the author indicates a relationship with a possible NBS already implemented.

4. The municipality on the expiration date evaluates the ideas collected and promotes the best idea. Once the evaluation period is closed and the evaluation must be publicly accessible.

5. The author of the best idea receives a notification and refines the idea, detailing it as best as possible, and involving other users to start working together. He/She assigns tasks to co-workers providing solution specifications and additional technical/business details. They indicate a relationship with the possible NBS already implemented, and when the refinement of the idea is completed the municipality promotes the idea to the implementation and monitoring phase.

Benefits/Why to use this tool: This tool provides several features facilitating the activities of public authorities and citizens, for example facilitating a catalogue of NBS already implemented in other sites, a task manager for coordination, a public voting system, transparent mechanisms for the evaluation and selection of ideas to increase trust in the public authority.

How it looks like/template: see Figure 3.1.1.

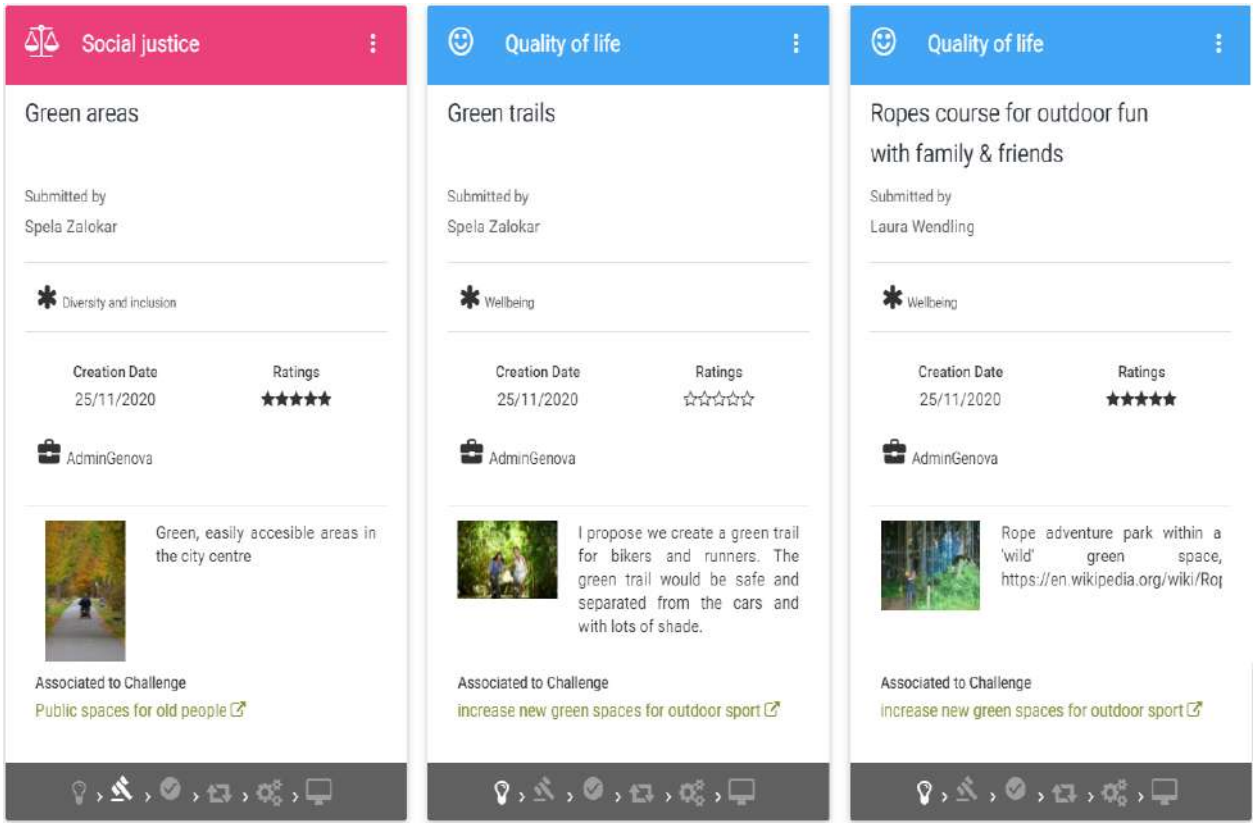


Figure 3.1.1. Example of Open nature innovation arena developed by UNaLab project
Source: https://unalab.enoll.org/co-creation-arena/

Remarques/Notes: The project manager and expert users will evaluate the collected ideas to identify the best solution to implement as NBS. The project manager could be supported by a team of designated users and experts.

Source/further reading:

https://unalab.enoll.org/co-creation-arena/

https://unalab.eu/en/news/co-creating-online-open-nature-innovation-arena

http://onia.unalab.eng.it/ideas_explorer

Tool 3.2. I like – I wish – what if

Main goal: To collect feedbacks from a project, meeting, or event in which the participants can exchange their positive observations (I like) to later share their thoughts on what is missing or could be improved (I wish). There is a third section that consider brainstorm ideas that have not been previously considered (what if).

Format: Workshop / Collaborative activity within an open session/discussion

Outcomes: Completed template and mind map

(Who?) Actors involved: Designer(s), moderator, members of the team, all stakeholders

Group size: not preliminary defined

Facilitation level: medium

Level of expertise/Effort: middle

Time frame: 1-3 h

Required materials: Whiteboard (online or physical) and sticky notes

Steps:

1. Invite users/team-mates/partners to provide open feedbacks.

2. Assign a moderator that should also share the board in advance with all participants and set expectations.

2. Start with the first section “I like” asking participants about their positive statements giving them a proper time.

3. Discuss the registered feedbacks asking each participant about their statement to register ideas and asking other participants on these views and to share their opinions.

4. Continue with the "I wish" section in which negative comments and constructive criticisms are collected,

5. Later, in the third section "What if?", New suggestions, ideas and future changes are recorded. These ideas may not be directly linked to the prototype and may lead to personal insights that need to be analyzed.

6. Gather and share the lessons with the team.

7. Create a plan of action that implements the changes discussed

Benefits/Why to use this tool: This tool allows to register feedbacks in an honest and positive manner, enabling an open discussion and assimilation of an idea

How it looks like/template: see Figure 3.2.1.

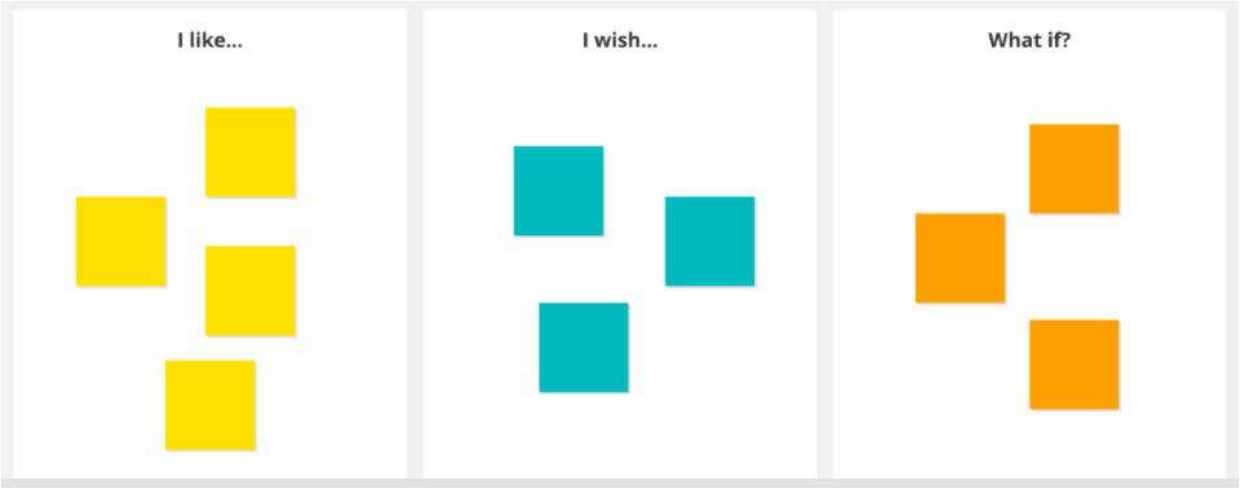


Figure 3.2.1. Example of I-Like-I-Wish-What-If template

Source: https://public-media.interaction-design.org/pdf/I-Like-I-Wish-What-If.pdf

Remarques/Notes: It is important to record everyone's feedback using colors, notes, and an organized methodology so that these ideas can be traced back to specific individuals

Source/further reading:

https://public-media.interaction-design.org/pdf/I-Like-I-Wish-What-If.pdf

https://conceptboard.com/blog/i-like-i-wish-what-if/

https://www.ayoa.com/templates/i-like-i-wish-what-if-template/

Tool 3.3. Dotmocracy

Main goal: Recognize the preferences of the participants from a long list of options in a simple and direct way.

Type: Workshop / Collaborative activity

Outcomes: Visual overview on the most preferred options

(Who?) Actors involved: Designer(s), a facilitator, and participants

Group size: 2-40 participants

Facilitation level: beginner

Level of expertise/Effort: easy

Time frame: 5-30 minutes

Required materials: Dot stickers, pens/markers, paper

Steps:

1. Participants receive the same number of dot stickers (decided by the facilitator)

2. They place the dot stickers next to the option they like as most. They may place the number of their available dot stickers as they wish among the different options.

3. Options with the most dots at the end of voting "win"

4. Participants discuss the results selecting and planning the future steps

Benefits/Why to use this tool: This tool is less cognitively demanding but allows very clear and representative visual results to be obtained without complicated coordination or discussion events. Additionally, this method creates a sense of commitment among the team and allows participants to see how the final decision was made.

How it looks like/template: see Figure 3.3.1.

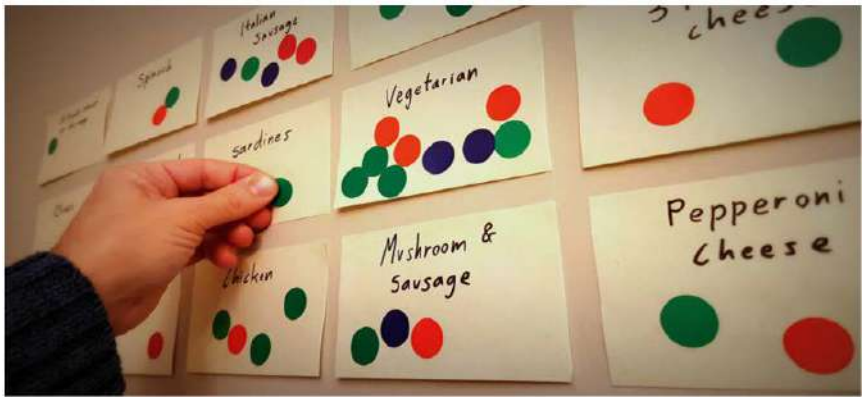


Figure 3.3.1. Example of dotmocracy
Source: https://toolbox.hyperisland.com/dotmocracy

Remarques/Notes: -

Source/further reading:
https://toolbox.hyperisland.com/dotmocracy
https://toi.expert/tool/dotmocracy/
https://dotmocracy.org/what_is/
https://dotmocracy.org/

Tool 3.4. Heuristic evaluation

Main goal: Find usability issues in the design of a user interface so that they can be addressed as part of an iterative design process.

Format: Workshop

Outcomes: List of identified usability problems to modify

(Who?) Actors involved: project members, all stakeholders

Group size: not preliminary defined

Facilitation level: advanced

Level of expertise/Effort: High effort

Timeframe: Variable – hours to days

Required materials: prepared posters, pins, coloured cards, pens, markers, laptop

Steps:

1. Define what you will evaluate – It is necessary to focus on a specific scope and objective to evaluate; the heuristic evaluation is carried out in small parts.

2. Know the behaviours and motivations of your user – It is important to understand the objectives and motivations of the user to use the product; It is essential to assess his/her perspectives, not yours. At this point, you can include other tools like User Personas to focus on a particular group.

3. Choose which heuristics you will use – There are few different sets of heuristics, among the most used and validated are: Jill Gerhardt – Powal's 10 Cognitive Engineering Principles; Alan Cooper's About Face 2.0: The essentials of Interaction Design; Ben Schneiderman's Eight Golden Rules of Interface Design.

4. Set up the way you will identify issues – People may view issues differently and the severity of each issue can vary between evaluators, so it is essential to discuss and rate each issue. There are several severity classifications, including: Cosmetic issue; Minor usability problem; Major usability problem; Critical usability problem.

5. Define the tasks – Frame the assessment with a general scenario that the user is going through, and the use of the task makes it easier to meet user's perspectives and allows the evaluator to remember the objectives proposed by the users.

6. Conduct the evaluation – Sit alone and go step-by-step through each interaction on each section you have decided to assess. Interact with each element and see if the elements violate any of the heuristics. Give yourself a few hours (or days in case of a full product) to properly evaluate.

7. Analyse and summarize the results – Bring together all the different evaluators and their findings. Record the number of times a problem occurred among evaluators and the average severity of each violation. The more frequent problems, and the greater their severity, the more priority they become.

Benefits/Why to use this tool: A clear list of usability issues, what heuristics they violate, and how severely they impact users. Using this information, designers can make quick and informed changes to improve the experience.

How it looks like/template: see Figure 3.4.1.

Figure 3.4.1. Example of heuristic-evaluation

Source: https://www.designorate.com/applying-heuristic-evaluation-in-usability-testing/

Remarques/Notes: This evaluation is not useful to apply to a single individual because it does not allow to find all the usability problems in an interface.

Source/further reading:

https://www.nngroup.com/articles/how-to-conduct-a-heuristic-evaluation/

https://www.interaction-design.org/literature/topics/heuristic-evaluation

https://adamfard.com/blog/heuristic-evaluation

https://dscout.com/people-nerds/heuristic-evaluations

Tool 3.5. Logic model

Main goal: To describe the logical linkages among program resources, activities, outputs, customers reached, and short, intermediate and long-term outcomes

Format: Template

Outcomes: Diagram illustrating the relationship between the components of a program

(Who?) Actors involved: Team members

Group size: (2-6 people)

Facilitation level: medium

Level of expertise/Effort: middle

Timeframe: not preliminary defined

Required materials: Logic Model worksheet

Steps:

1. Following the Logical Model worksheet, identify the components and characteristics of the program under analysis.

2. Use arrows to indicate relationships: they show how one program function affects another.

3. Use evaluation questions that may be associated with each component of the program.

4. Analyze the generated diagram

Benefits/Why to use this tool: Logic models can help educators plan and monitor program evaluations by exploring the relationships between program resources, activities, outputs, and outcomes, and representing them through diagrams. Educators can use these representations to determine the extent to which programs are having their intended effects.

How it looks like/template: Template of Figure 3.5.1 represents the example of developing a science program in elementary school to increase student academic achievement in science.

Remarques/Notes: -

Source/further reading:

Lawton B., Brandon P.R., Cicchinelli L., Kekahio W. (2014) Logic models: A tool for designing and monitoring program evaluations. Hawaii: Regional Educational Laboratory Pacific. Available at: https://ies.ed.gov/ncee/edlabs/regions/pacific/pdf/REL_2014007.pdf (assessed on 12.05.2021)

https://www.sciencedirect.com/science/article/abs/pii/S0149718998000421

https://evaluationsupportscotland.org.uk/resources/interactive-logic-model-template/

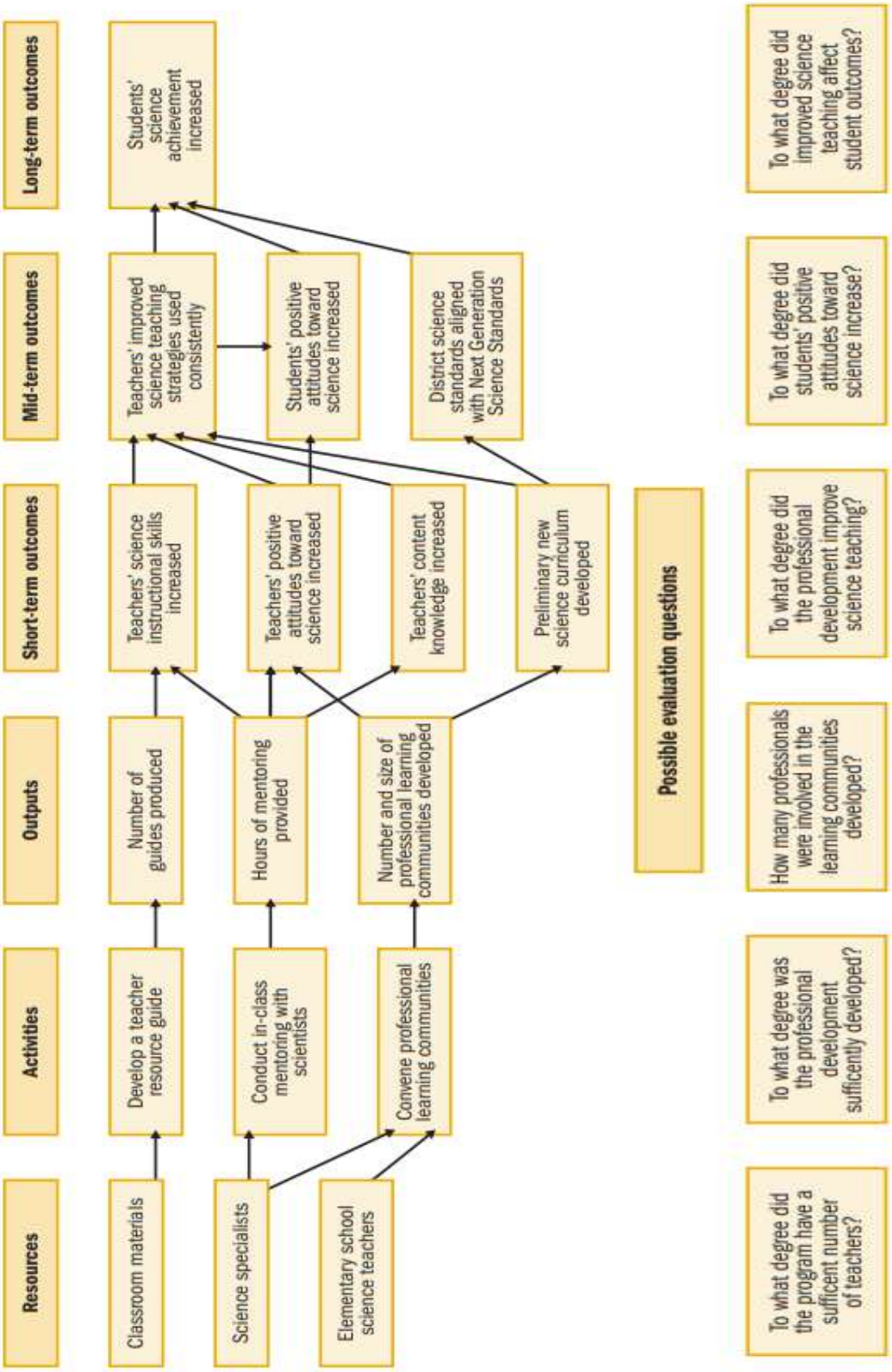


Figure 3.5.1. Example of logic model

Source: Lawton et al., 2014

Tool 3.6. Transformative impact

Main goal: Stimulate learning and critical reflection to better understand the transformative impact of an initiative in relation to its context, as well as identify actions and interventions that can increase the transformative impact.

Format: Workshop

Outcomes: Transformative impact Map

Group size: 2-8 participants

Facilitation level: medium

Level of expertise/Effort: middle

Time frame: 30-90 minutes

Required materials: Scoring wheel worksheet, guiding questions paper, pens

Steps:

1. Make sure there is a clear and shared understanding of the initiative that you will discussing and scoring (what, how, who).

2. Discuss the initiative's score on the different qualities with the help of the guiding questions.

3. Discuss how the initiative could be developed and/or supported to increase its transformative impact on (some of) these qualities.

Benefits/Why to use this tool: It provides an alternative for holding discussions in an educational setting or within an initiative as a participatory tool with a broader group of stakeholders. Furthermore, it can be used by intermediaries and funders to compare and evaluate different initiatives, or as a central component of a monitoring and support strategy for social innovation initiatives.

How it looks like/template: see Figure 3.6.1.

Remarques/Notes: According to Janssen, the transformative impact tool can be used to assess the potential of citizen science projects to change the status quo, by allowing the active participation of citizens for example in the creation of NoiseMaps.

Source/further reading:

Heiss, R., & Matthes, J. (2017). Citizen science in the social sciences: A call for more evidence. GAIA-Ecological Perspectives for Science and Society, 26(1), 22–26.

Irwin, A. (2002). Citizen science: A study of people, expertise and sustainable development. London: Routledge.

Phillips, T. B., Ballard, H. L., Lewenstein, B. V., & Bonney, R. (2019). Engagement in science through citizen science: Moving beyond data collection. Science Education, 103(3), 665–690

Senabre Hidalgo E., Perelló J., Becker F., Bonhoure I., Legris M., Cigarini A. (2021) Participation and Co-creation in Citizen Science. In: Vohland K. et al. (eds) The Science of Citizen Science. Springer, Cham. https://doi.org/10.1007/978-3-030-58278-4_11

https://www.silearning.eu/tools-archive/design-your-agenda-2/

https://www.silearning.eu/wp-content/uploads/2017/04/6.transformative-impact-tool.pdf

https://actionproject.eu/transformative-impact-noisemaps-disrupts-the-status-quo/

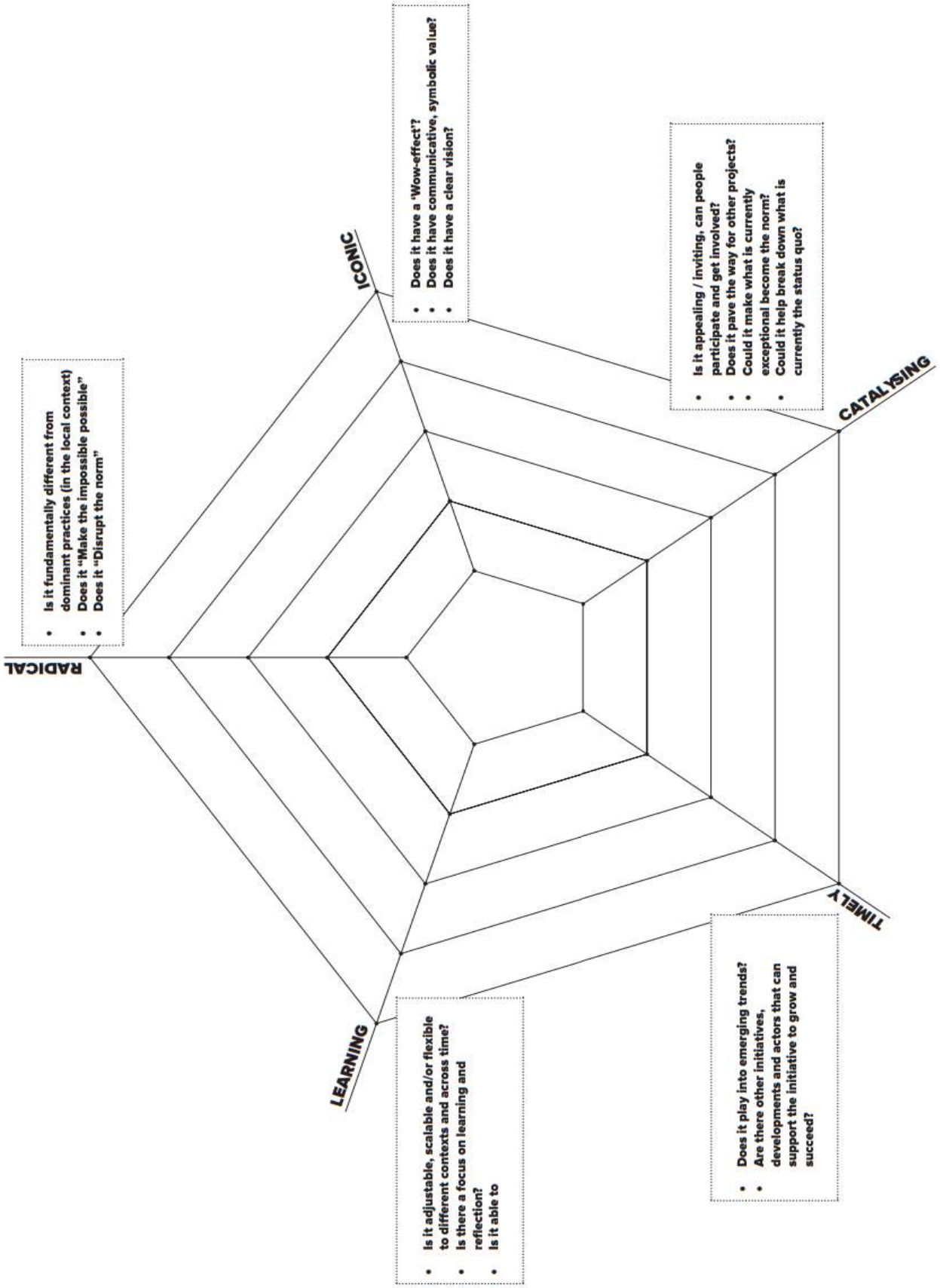


Figure 3.6.1. Example of transformative impact model

Source: https://www.silearning.eu/wp-content/uploads/2017/04/6.transformative-impact-tool.pdf

Tool 3.7. Critical tasks list

Main goal: Make sure that what you set out to do is actually possible within the timeframe and budget you have available.

Format: Template

Outcomes: Organized list of activities and their details

(Who?) Actors involved: team members

Group size: 2-6 people

Facilitation level: beginner

Level of expertise/Effort: easy

Timeframe: not preliminary defined

Required materials: Critical task list worksheet

Steps:

1. List all the activities to be carried out together with the person(s) responsible.
2. Specify the budget available for each activity.
3. Specify the completion period
4. Indicate the final approval process

Benefits/Why to use this tool: The list provides a common reference point to keep track of how things are going, allowing you to manage your projects by focusing on the appropriate tasks.

How it looks like/template: see Figure 3.7.1.

ACTIVITY	ASSIGNED TO	BUDGET	DEADLINE	SIGN OFF

Figure 3.7.1. Example of transformative impact model

Source: https://diytoolkit.org/tools/critical-tasks-list/

Remarques/Notes: Using this tool is useful when working alone, but even more important when you need to focus and align your work with others.

Source/further reading:

https://diytoolkit.org/tools/critical-tasks-list/

Tool 3.8. Scaling plan

Main goal: To stimulate a serious dialogue within the organization to build a shared vision on how and when to scale a pilot project.

Format: Workshop

Outcomes: Ideas about relevant components to consider to scale-up the project

(Who?) Actors involved: Team members, potential donors, beneficiaries, and stakeholders

Group size: from middle to large group

Facilitation level: advanced

Level of expertise/Effort: high

Time frame: several days

Required materials: Scaling plan worksheet

Steps:

1. Organize a workshop with selected people involved in the project

2. Use the worksheet as a guide and answer the questions as prompts for a critical discussion on what you are certain about and what need further investigation

3. While filling out the worksheet try to give evidence in form of factual data (not anecdotes). Try to be as open, thorough, and self-critical as possible.

4. Analyse the responses, discuss, and reflect on the recorded situation

Benefits/Why to use this tool: This process provides a pre-scenario that helps develop a shared vision for scaling up while evaluating resources and whether the organization is ready to take the next step.

How it looks like/template: see Figure 3.8.1.

Remarques/Notes:

Source/further reading:

https://diytoolkit.org/tools/scaling-plan-tool/

https://msiworldwide.com/sites/default/files/2021-03/ScalingUp_toolkit_printabletools_tool2_v3.pdf

https://vimeo.com/103699542

Figure 3.8.1. Example of Scaling plan

Source: https://diytoolkit.org/tools/scaling-plan-tool/

Tool 3.9. Scoring and rating

Main goal: In order to systematically evaluate and compare the selected assessment tools, a set of criteria should be developed for which scores would be applied. These criteria aim to address two equally important perspectives when undertaking for example ES or other benefit assessments; scientific validity and practical requirements.

Format: Template and workshop

Outcomes: selected tools / indicators

(Who?) Actors involved: Team members, potential donors, beneficiaries, and stakeholders

Group size: from middle to large group

Facilitation level: advanced

Level of expertise/Effort: high

Timeframe: several hours to days

Required materials: Scoring and rating metrics results

Steps: The selection of criteria should start with a desktop review of existing assessments. Specifically, the work of Alvarado (2019) in synthesising and organising criteria for selecting appropriate indicators for ES provided an enlightening approach which was adopted for assessment tools. Additionally, informal discussions can be conducted with a range of actors including local stakeholders, external researchers, and local proponents of NBS sites. The purpose of these discussions is to understand the needs and priorities of different NBS stakeholders that may not be immediately evident.

It is difficult to understate the importance that resiliency has on an ecosystem's ability to provide future flows of services, particularly those related to risk reduction and climate change adaptation. Thus, in order to be relevant for the local areas, any comprehensive assessment of the performance of NBS should be able to link ecosystem service flows to the underlying ecosystem's structure and integrity. Using the criteria presented in the tables below, each of the selected assessment tools can be quantitatively evaluated through a scoring matrix. Scores ranging from 0-3 should be assigned to each tool based on the types of sources. The creation of a scoring matrix allows for a direct comparison of several assessment tools based on cumulative scores and resulted in one tool achieving the highest score based on the aforementioned criteria.

This 'winning' tool will be then chosen as the most suitable tool for application on an NBS case study.

Benefits / Why to use this tool: Scoring and rating (e.g. performance indicators) is of critical importance during the evaluation phase.

How it looks like/template: see Figure 3.9.1 a-b and Figure 3.9.2.

Category	Description	Criteria	Scoring guidance
Ecosystem health / state of NBS *Based on the work of Feld et al. (2009)*	Can the tool incorporate data on ecosystem health properties and thus provide a link to ecosystem service flows?	*Structure (abiotic and biotic elements that underpin ecological habitats for biodiversity)*	3 = tool can incorporate structural NBS elements when analysing ES 0 = no room for including structural NBS elements in the tool
		Integrity (spatial dimensions, connectivity to other ecosystems)	3 = tool accounts for spatial connectivity of NBS to greater ecosystem network 0 = tool cannot incorporate NBS connectivity within ES analysis

a

Category	Description	Criteria	Scoring guidance
Ecosystem services / NBS performance *Based services on the work of Crossman et al. (2013) and Nemec & Raudsepp-Hearne (2013)*	Does the tool capture a wide range of urban ES and their relevant characteristics?	*Completeness (out of a possible 28 relevant urban ES - see Annex II)*	3 = relatively high number of ES that the tool can measure 0 = relatively low number of ES that the tool can measure
		Uncertainty (how much confidence can be placed in tool results)	3 = uncertainty is explicitly accounted for and presented alongside tool results 0 = no explicit handling or mention of uncertainty for tool results
		Economic analysis (monetary valuation of ES)	3 = monetary valuation of all ES is included within the tool 0 = tool does not monetise any of the measured ES

b

Figure 3.9.1. Example of evaluation criteria related to ecosystem health (a) and NBS performance (b)

Source: Alvarado (2019)

Category	Description	Criteria	Scoring guidance
Feasibility / practicality *Based on the work of Bagstad et al. (2013) and van Oudenhoven et al. (2018)*	What are the data, capacity and resource requirements to continuously and rigorously utilise the tool in a way that provides up-to-date results to inform decision making?	*Capacity (technical skills, required knowledge)*	3 = only basic non-technical skills required to use tool 0 = Extensive technical training and expertise required to use tool
		Data requirements (number of inputs and availability)	3= low data requirements (minimal inputs or required data is easily and readily available) 0 = high data requirements (large amounts of data required or perceived difficulty in data collection)
		Scalability (relevant urban scales: site, local, landscape)	3 = can measure at all three relevant urban scales and beyond 0 = can only measure at one of the relevant urban scales
		Adaptability (whether input data can be expanded beyond what the tool requires)	3 = Additional data sources can easily be incorporated to update results 0 = No room for additional data sources beyond tool requirements

Figure 3.9.2. Example of evaluation criteria related to feasibility / practicality
Source: Alvarado (2019)

Remarques/Notes: -

Source/further reading:

Alvarado O. (2019) Measuring the benefits of urban nature-based solutions through quantitative assessment tools. Master's Thesis - Water Science and Management. file:///C:/Users/Diana/Downloads/FinalThesisReport-OscarAlvarado.pdf

Castellar J., Popartan l.A., Pueyo-Ros J. et al. (2021) Nature-based solutions in the urban context: terminology, classification and scoring for urban challenges and ecosystem services. Science of The Total Environment 779(1):146237. DOI: 10.1016/j.scitotenv.2021.146237

Tool 3.10. Delphi survey / method / techniques

Main goal: To arrive at a group opinion or decision about a future event by surveying a panel of experts

Format: Workshop

Outcomes: View of a future event or issue made by experts that helps to identify risks and opportunities of a project.

(Who?) Actors involved: Facilitator(s), group of experts

Group size: middle group (up to 6-8 people)

Facilitation level: medium

Level of expertise/Effort: middle

Time frame: 1-3 h

Required materials: Questionnaires, surveys, communication systems or platforms

Steps:

1. Choose a facilitator – Neutral person within the organization.

2. Identify the experts – It is required a panel of experts composed by individuals with relevant knowledge and experience of a particular topic

3. Define the Problem – A precise and comprehensive definition of the problem or issue should be provided to the experts

4. First round of questions – This round considers general questions to gain a broad understanding of the experts view on future events. Questions can be provided through questionnaires or surveys, and then expert responses should be summarized and collated.

5. Second round of questions – Based on the responses to the first questions, the second round of questions provided again in questionnaires and surveys should delve deeper into the topic to clarify specific issues. The answers need to be collated and summarized one more time.

6. Third round of questions – A final questionnaire should be delivered focused on supporting decision making considering areas of mutual agreement or consensus.

7. Act on the findings – Taking the findings into account, the experts would have reached a consensus and the team will get a picture of future events. It is necessary to analyze the findings found and think about future risks and opportunities that may arise in the project.

8. Conclusion

Benefits/Why to use this tool: The consensus of the experts is based on the mutual agreement that provide answers that estimate the likelihood and outcome of future.

How it looks like/template: see Figure 3.10.1.

Figure 3.10.1. Example of Delphi method

Source: http://www.mspguide.org/tool/delphi

Remarques/Notes: Expert participation can be remote (without physical interaction) and anonymous if they prefer.

Source/further reading:

https://edepot.wur.nl/409844

https://www.investopedia.com/terms/d/delphi-method.asp

https://www.projectsmart.co.uk/delphi-technique-a-step-by-step-guide.php

Tool 3.11. Multi-criteria decision analysis (MCDA)

Main goal: Evaluate various (conflicting) criteria as part of the decision-making process, providing a general order of options from most preferred to least preferred.

Format: Template + Workshop

Outcomes: Table with weighted options based on known criteria

(Who?) Actors involved: Team members, stakeholders.

Group size: not preliminary defined

Facilitation level: medium

Level of expertise/Effort: middle

Time frame: not preliminary defined

Required materials: templates to be filled, pens

Steps:

1. Define the context – The context must consider the current situation, key players, and stakeholders in the decision-making process.

2. Identify the options available – MCDA compares multiple different options against each other despite their current status, so it is necessary to have adjustable options for the analysis. Considering that options are often formulated on a pass/fail basis, the consequences attached to each option determine whether they lead to a decision to go or not.

3. Decide the objectives and select the right criteria that represent the value – Identify criteria for assessing the consequences of each option. The criteria represent clearly defined standards by which different options can be measured, compared, and express the different level of value that each option creates.

4. Measure out each of the criteria in order to discern their relative importance – This is a process of weighting (and standardizing) the relative importance of each criterion for the decision.

5. Calculate the different values by averaging out weighting and scores – In this step is necessary to calculate overall weighted scores at each level in the hierarchy of criteria.

6. Examine the results – The last step considers the organization of outcomes in order to identify which options are the most appropriate based on the different preference scores.

Benefits/Why to use this tool: This tool resembles a cost-benefit analysis but is not limited to monetary units in its comparisons. In this sense, MCDA considers multiple criteria and levels of scale in accounting to make comprehensive or important decisions.

How it looks like/template: see Figure 3.11.1 a-b.

Interest	Wt	Sub-interest	Wt
Proximity to other facilities	10	Other year-round aquatic centers	10
		Community centers	3
		High schools	9
Environmental impact	60	Disruption to mature trees and veg.	20
		Topographic challenges	45
		Impact to watershed	60
Traffic impact	30	Traffic Impacts	30

a

Subinterest	Wt	Rating				Score			
		H	C	B	NC	H	C	B	NC
Other yr-round aquatic centers	10	4	5	3	4	40	50	30	40
Community centers	3	5	3	5	3	15	9	15	9
High schools	9	4	5	5	3	36	45	45	27
Disruption to mature trees & veg	20	4	5	4	1	80	100	80	20
Topographic challenges	45	4	5	4	2	180	225	180	90
Impact to watershed	60	3	4	3	1	180	240	180	60
Traffic Impacts	30	5	5	4	3	150	150	120	90
Totals						681	819	650	336

b

Figure 3.11.1. Example of multi-criteria decision analysis method (a,b)

Source: https://projects.ncsu.edu/nrli/decision-making/MCDA.php

Remarques/Notes: This tool offers different advantages related to the reliability of the results, the availability to adjust the chosen criteria, use the scores and weights as a reference, among other aspects.

Source/further reading:

http://eprints.lse.ac.uk/12761/1/Multi-criteria_Analysis.pdf

https://www.toolshero.com/decision-making/multiple-criteria-decision-analysis-mcda/

https://projects.ncsu.edu/nrli/decision-making/MCDA.php

Tool 3.12. Prioritizing and ranking

Main goal: Help to select the most promising ideas or options when many have been generated

Format: Workshop

Outcomes: Ideas ranking list

(Who?) Actors involved: Facilitator(s), team members

Group size: not preliminary defined

Facilitation level: beginner

Level of expertise/Effort: easy

Time frame: not preliminary defined

Required materials: Sticky dots, chart paper, coloured pencils and markers

Steps: 1. Select promising ideas: Team members can vote on their favourite ideas while they are still fresh in their minds:

- Cluster the ideas – Take a few minutes after a brainstorming session to group similar ideas
- Vote for favourite ideas – Ask the brainstorming participants to select an idea that is their personal favourite that they would like to work on, or the one that they believe is the most promising. Use a limited number of options for people to decide silently, then also vote directly on brainstorming posts, either using sticky dots or just drawing a dot.
- Discuss the results – Count the votes and determine the most popular ideas, then take the most promising ideas and decide which ones to develop further. Be realistic about the number of ideas you can follow.

2. Narrowing a long list: If there are many ideas and not consensus on which ideas to choose, a ranking exercise can help to select the most important ones in a systematic way. It is necessary that the team is clear with the selection criteria being used. Once the criteria are clear, an easy way to narrow down the long list is to divide the list by three. Dividing the number of brainstorming elements and giving the same number of options to each participant, they will have to rating the ideas according to priorities, ordering them in a list. Finally, the upper third will represent the most prioritized ideas.

3. Ranking and scoring: Considering a list made up of 10 ideas in which the relevance of each of them is not clear, the use of a mathematical analysis could help.

- Write the 10 ideas on a flip chart visible to the whole group
- Each member of the group must rank the ideas in descending order by assign a number to each item, from the most (10) to least (1) important
- Calculate average scores based on the individual ranking
- Discuss the setting of priorities
- Redo ranking (if necessary)

Benefits/Why to use this tool: This tool is useful for deciding which ideas to keep or discard after brainstorming or another tool that generated a lot of ideas.

How it looks like/template: -

Remarques/Notes: -

Source/further reading:

https://edepot.wur.nl/409844; http://www.mspguide.org/tool/prioritizing-and-ranking

Tool 3.13. Multiple perspective wheel

Main goal: To help a group see an issue from as many vantage points as possible

Format: Workshop + Template/vusualization

Outcomes: Cards (or large paper wheels) with description of different perspectives

(Who?) Actors involved: Facilitator(s), stakeholders

Group size: several groups up to 8 people each

Level of expertise/Effort: middle

Time frame: 2-3 h

Required materials: Cards or large paper wheels, tables, chairs

Steps:

1. Prepare – Write the name of the issue, project or task on a large card and lay it in the centre of the table. Then write up cards with the name or titles of 6-8 key stakeholders for the issue being explored. Stakeholders can be listed through a quick brainstorming or drawn from a previous stakeholder analysis exercise.

2. Generate perspectives – Distribute the stakeholder cards randomly among the group members. One by one, group members are asked to contribute to understanding the problem from the stakeholder's perspective on the card they are holding. Ask the participants to imagine themselves in the position of this stakeholder and comment on the topic one by one. Then collect ideas for green leverage on another flip chart. Take a round to allow everyone in the group to share their comments from their perspectives. Group members cannot pass playing the role of that person. After the round is completed, collect the stakeholders' cards, shuffle them, and distribute them again. As before, people will share feedback from the stakeholder perspective on the card they received, building on the feedback already collected on the flip charts. Repeat this previous step at least three times to allow people to explore different perspectives.

3. Working with the perspectives – After this experience full descriptions of each perspectives have been generated. The team can then discuss the situation from each perspective after they have reviewed the flipcharts with problems and ideas to build on. Finally, reflect on the exercise by asking questions about, for example, similarities and differences, what you learned from another perspective, how new information can improve our effectiveness, among others.

Benefits/ Why to use this tool: It is a useful tool for exploring and including different perspectives from stakeholders about an issue.

How it looks like/template: see Figure 3.13.1.

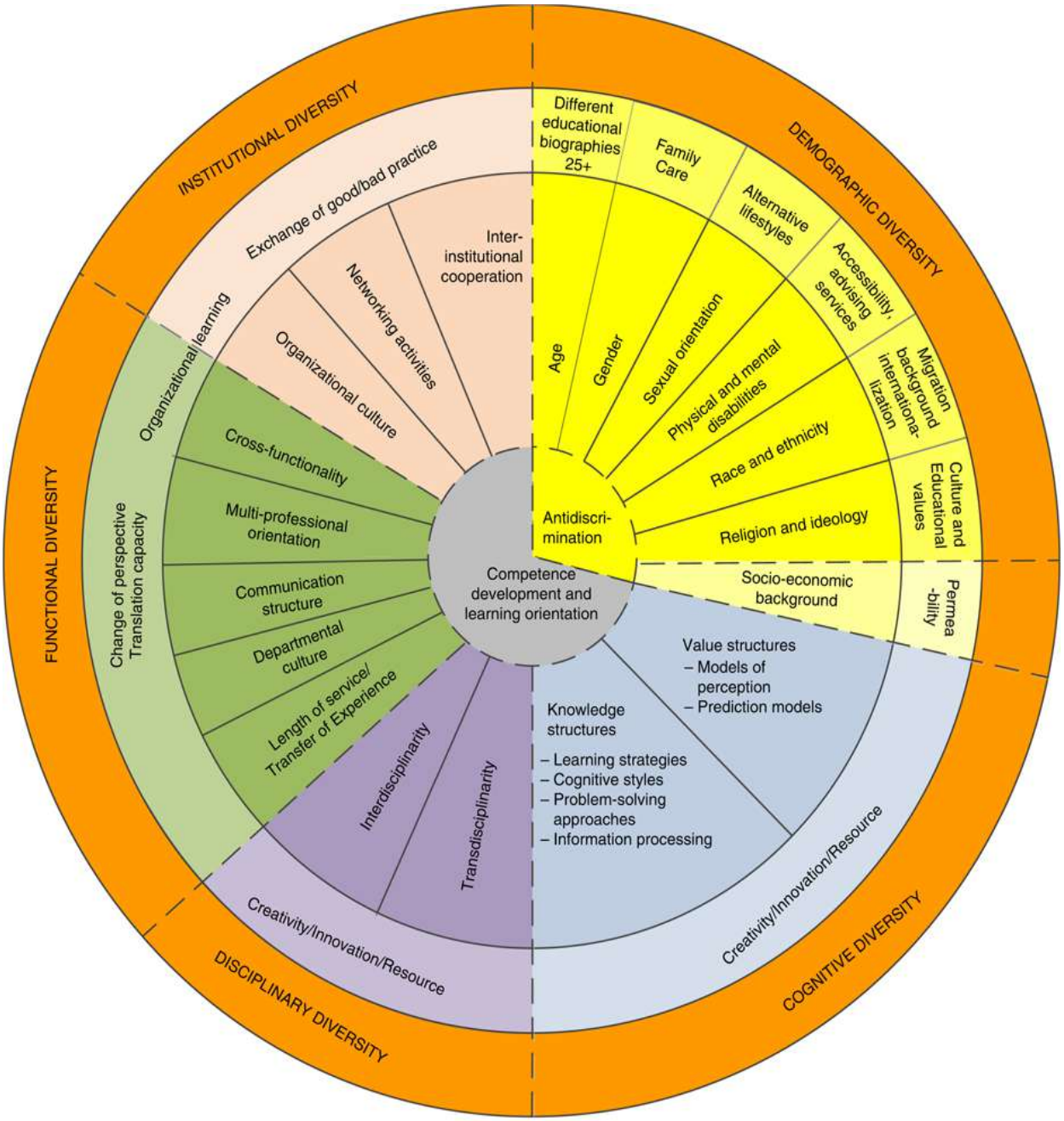


Figure 3.13.1. Example of multiple perspective wheel
Source: Gaisch et al., 2020

Remarques/Notes: Maximum 8 people per table. Some stakeholders may be presents, others not.

Source/further reading:

Gaisch S., Preymmann M., Aichinger R. (2020) Diversity management at the tertiary level: an attempt to extend existing paradigms. Journal of Applied Research in Higher Education https://www.emerald.com/insight/content/doi/10.1108/JARHE-03-2018-0048/full/html

http://www.mspguide.org/tool/multiple-perspectives
https://infed.org/peter-senge-and-the-learning-organization/
https://medium.com/@elo_sf/got-a-problem-try-making-a-perspectives-wheel-dfc88b55468c

Tool 3.14. Fuzzy cognitive maps

Main goal: is a cognitive map within which the relations between the elements (e.g. concepts, events, project resources) of a "mental landscape" can be used to compute the strength of impact of these elements. It is a formal way of representing social scientific knowledge and modelling decision making in social and political systems brought in the computation fuzzy logic. It is a research method suitable for getting an insight into stakeholders' perceptions towards some issue or problem.

It is a qualitative or rather semi-quantitative and dynamic method to structure expert knowledge that aims to capture a person's perception of a particular issue in a diagrammatic format. Fuzzy cognitive map graphs provide both the modeler and the interviewee with an informal structured process having the ability to give additional beliefs, insights and concepts about a certain domain. Furthermore, the interrelations and interdependencies of these concepts are also revealed, providing information about how the change of one issue can affect the others.

The main aim is elicitation of qualitative data which are then used to build a model of the system in terms of a set of variables and the causal relations among these variables, which are recorded as directed links in a graph. Variables can be physical quantities that can be measured, such as amount of precipitation or percent vegetation cover, or complex aggregate and abstract ideas, such as political forces or aesthetics which are not assigned any number. The links are assigned a number.

Format: Template / visualisation and workshop.

Outcomes: visualisation of results of social scientific knowledge and modelling decision making in social and political systems.

(Who?) Actors involved: members of internal team observing the local settings, experts, member of different social groups

Group size: not preliminary defined

Facilitation level: medium

Level of difficulty/Effort: middle

Timeframe: from several hours to several days a week

Required materials: maps printed in A0 format, pens, colour markers, illustrative material

Steps: Experts can use their knowledge in the area under study to develop a fuzzy cognitive map by firstly identifying the main concepts involved and secondly indicating the causal relationships among these concepts. The final step is the calculation of the causal relationships' strengths using either crisp numeric values within the range [−1, 1] or using linguistic variables and values that at second stage are defuzzied into numeric. Furthermore, experts can improve an existed fuzzy cognitive map by collectively analysing the key characteristics of the system under study and re-evaluating the structure and the interconnections of the graph using fuzzy conditional statements or fuzzy rules. The algorithm used for the development of a fuzzy cognitive map is depicted below (Kokkinos et al., 2018; Groumpos and Anninou, 2017):

Step 1: Experts select the concepts Ci that constitute the FCM graph.

Step 2: Each expert defines the causal relationship between any two concepts, if there exists one (positive, negative, neutral).

Step 3: Experts carefully determine the value of the relationship between the two concepts.

Step 4: Experts describe initially the causal influence using linguistic variables, such as “low,” “medium,” “high” etc. The sign of each weight (+ or –) represents the type of influence between concepts. There are three types of interconnections between two concepts Ci and Cj:

- ° wij ≥ 0 means that an increase or decrease in concept Ci causes the same result in concept Cj.
- ° wij ≤ 0 means that an increase or decrease in concept Ci causes the opposite result in concept Cj.
- ° wij = 0 means that there is no relation between concepts Ci and Cj.

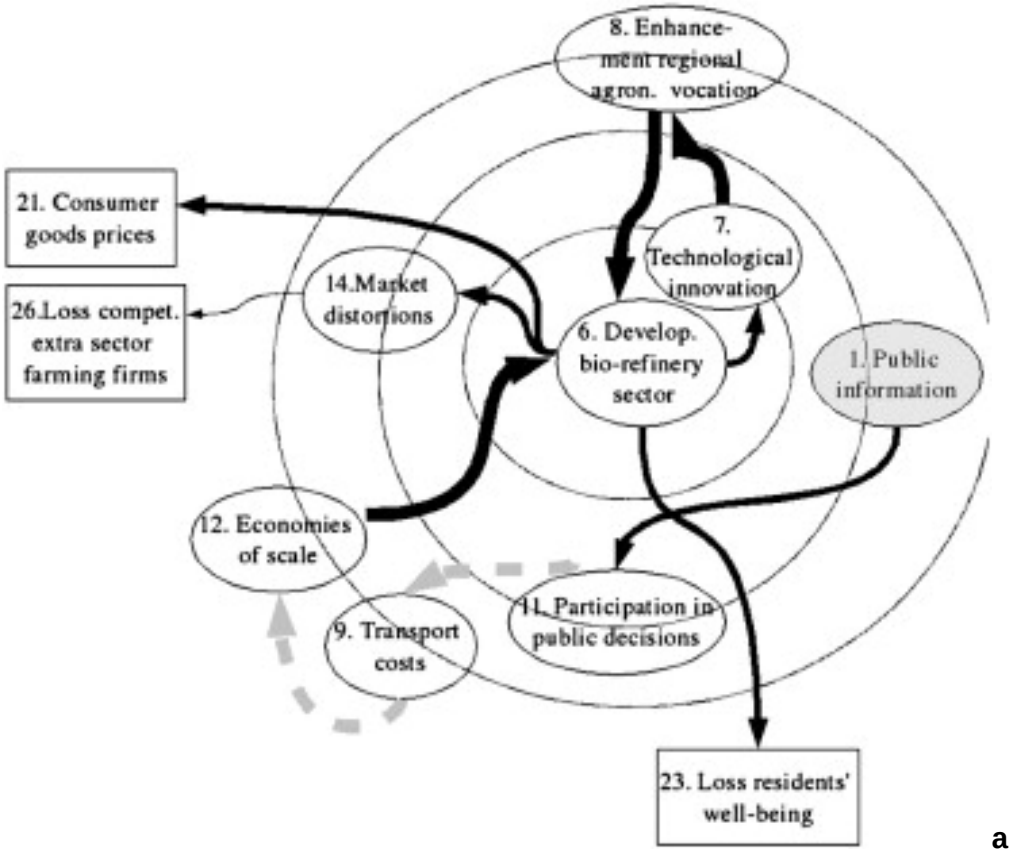
The degree of influence between the two concepts is indicated by the absolute value of wij. During the simulation, the value of each concept is calculated using the following rule:

$$Ai(k)=f(k1Ai(k-1)+\sum j=1, j\neq iNwji \times Aj(k-1))$$

Benefits/why to use this tool: Visualisation and analysis of the resulting fuzzy cognitive map can be useful in several ways:

- to identify possible 'drivers' of development of the whole system (and therefore policy levers);
- to elicit behavioural rules of actors, their probable responses to different policies, and how these may in turn affect a system;
- or to compare and contrast different the perceptions of different stakeholder groups and raise awareness and develop shared understandings of this, for example.
- many researchers highlight the speed and ease with which sufficient information can be gathered to build a fuzzy cognitive map.

How it looks like / template: see Figure 3.14.1 a,b.



a

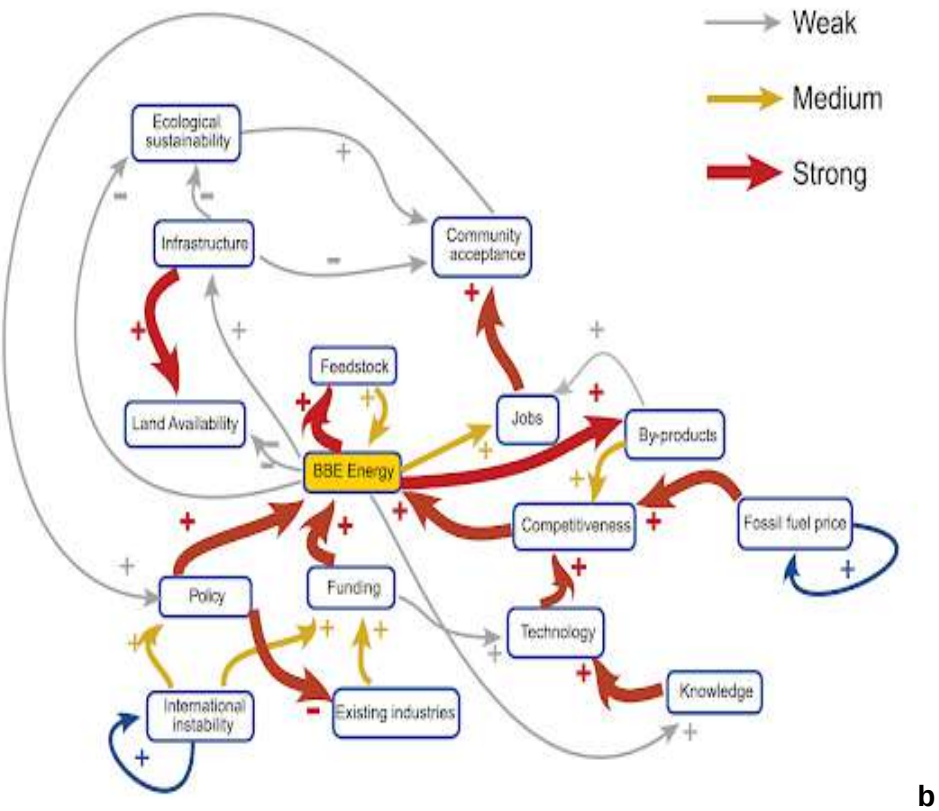


Figure 3.14.1 a,b. Example of fuzzy cognitive maps

Source: Lopolito et al., 2011; http://steerplex.org.uk/tools/today-tools/fuzzy-cognitive-maps-fcm

Remarques/Notes: A drawback of the method is that the maps are static and found to not easily incorporate new information. On the other hand, the functions/weights can be easily changed. Optionally, a neural network computational method can be applied to compute an outcome for given initial conditions (which may include policy scenarios).

Source/further reading:

Kokkinos K., Lakioti E., Papageorgiou E., Moustakas K., Karayannis V. (2018) Fuzzy Cognitive Map-Based Modeling of Social Acceptance to Overcome Uncertainties in Establishing Waste Biorefinery Facilities. Front. Energy Res., https://doi.org/10.3389/fenrg.2018.00112

Kosko B. (1986) Fuzzy cognitive maps. International Journal of Man-Machine Studies 1, 65–75.

Lopolito A., Nardone G., Prosperi M., Sisto R., Stasi A. (2011) Modelling the bio-refinery industry in rural areas: A participatory approach for policy options comparison, Ecological Economics, 72, 15, 18-27, ISSN 0921-8009, 10.1016/j.ecolecon.2011.09.010.

Morone P., De Lucia C., Lopolito A., Prosperi M. (2012) Modelling Stakeholders Interplay and Policy Scenarios for Biorefinery Implementation. In: Kazmi, A. (ed.) Advanced Oil Crop Biorefineries, Royal Society of Chemistry, Cambridge, UK.

Özesmi, U and Özesmi, S.L. (2004) Ecological models based on people's knowledge: a multi-step fuzzy cognitive mapping approach, Ecological Modelling 176, 43–64 doi:10.1016/j.ecolmodel.2003.10.027

Turnpenny, J., A. Haxeltine, T. O'Riordan, and Lorenzoni. I. (2005) Mapping actors involved in climate change policy networks in the UK In Tyndall Centre Working Paper 66.

Sub-cluster 4: Tools to monitor and evaluate the NBS impact

Tool 4.1. Social mapping

Main goal: To identify the relevant existing structures and key stakeholders involved in a focus area.

Format: Workshop

Outcomes: List of different stakeholder groups

(Who?) Actors involved: Facilitator, stakeholder, team members

Group size: not preliminary defined

Facilitation level: medium

Level of difficulty/Effort: middle

Timeframe: 1-2 hours

Required materials: Flipchart paper, markers, masking tape, coloured stickers, coloured markers, cards with groups' names

Steps:

Step 1. Identify socially influential groups.

Actors: 8 to 10 invitees of representative groups list and rank all identified.

Outcomes: Different social groups are described (purpose, age, type of members, frequency of meeting) and their degree of connectivity and influence is analysed. Grids depict the list and analysis of the female, male, and mixed-sex groups that are ideal for a social network approach.

How to organize:

- Tape each card for the "Type" of groups onto a different sheet of flipchart paper.
- Post the cards and the flipchart paper around the room
- Provide each participant with a marker
- Participant will start moving around the room brainstorming and writing the names of different groups found in the primary focus area under each "Type" of group.
- After the group has finished brainstorming, provide each participant with colored stickers or brightly colored markers.
- Ask the participant to go back across the room, to each "Type" of group and highlight or mark with a sticker any group that is currently contributing to the focus area in some specific or practical way.
- Finally, the different "Type" of groups will be identified in the aspects that they are contributing helping the starter group to develop a picture of current efforts underway

Step 2. Identify groups' social dynamics and Influential Individuals.

Actors: 3 to 4 representative groups map and discuss the community.

Outcomes: Multiple maps demarcate institutional and neighborhood social characteristics. A list of socially influential and connected women and men is developed.

Step 3. Filter influential groups and Influential Individuals.

Actors: Staff review data and select the most influential groups and individuals based on community analyses.

Outcomes: List of groups and individuals to meet with prior to final selection.

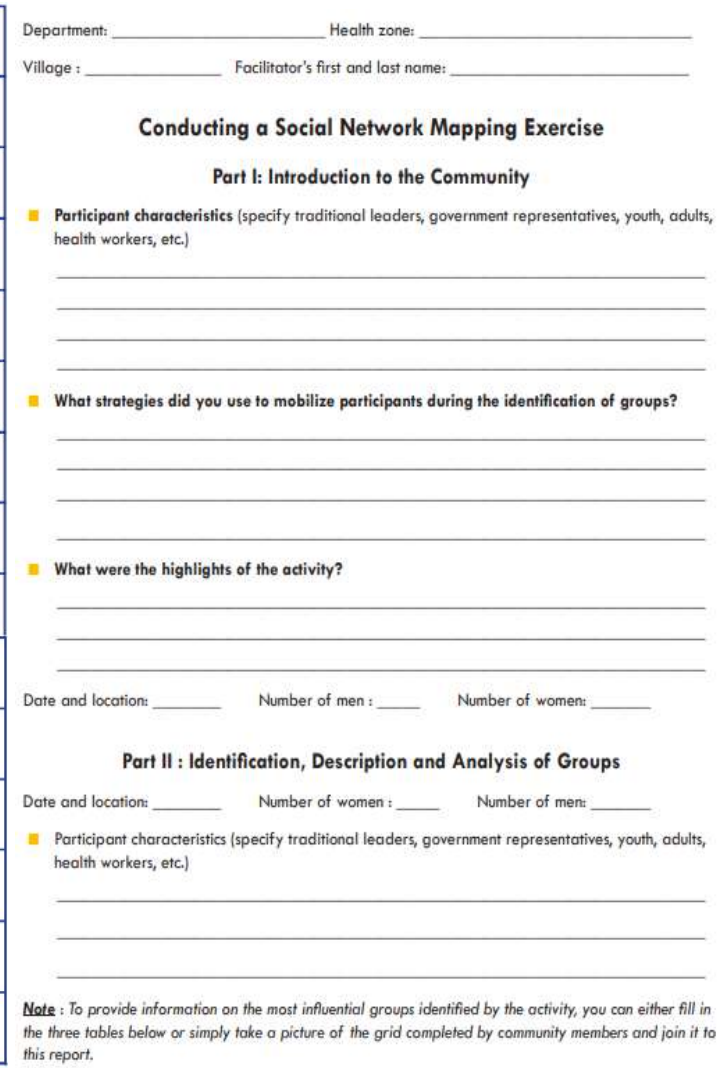
Step 4. Validate selected influential groups and Influential Individuals.

Actors: Staff visit groups and individuals to validate characteristics, including connectivity and influence.

Outcomes: Final selection of 3 groups (each of whose members select one Catalyzer) and 3-5 Influential Individuals.

Benefits/Why to use this tool: This process helps the initial group and the work team to understand the social and institutional context of their work and provides them with information on which individuals, groups and organizations are contributing to a particular approach, and in what way. It helps to define important people and social groups as well as their interrelationships.

How it looks like/template: The cards below (Figures 4.1.1-4.1.2) are an example of the "Type" of groups related to "People who contribute to the well-being of children in a specific area."


Department: _____ Health zone: _____

Village : _____ Facilitator's first and last name: _____

Conducting a Social Network Mapping Exercise

Part I: Introduction to the Community

- **Participant characteristics** (specify traditional leaders, government representatives, youth, adults, health workers, etc.)

_____

_____

_____

_____

- **What strategies did you use to mobilize participants during the identification of groups?**

_____

_____

_____

_____

- **What were the highlights of the activity?**

_____

_____

_____

Date and location: _____ Number of men : _____ Number of women: _____

Part II : Identification, Description and Analysis of Groups

Date and location: _____ Number of women : _____ Number of men: _____

- Participant characteristics (specify traditional leaders, government representatives, youth, adults, health workers, etc.)

_____

_____

_____

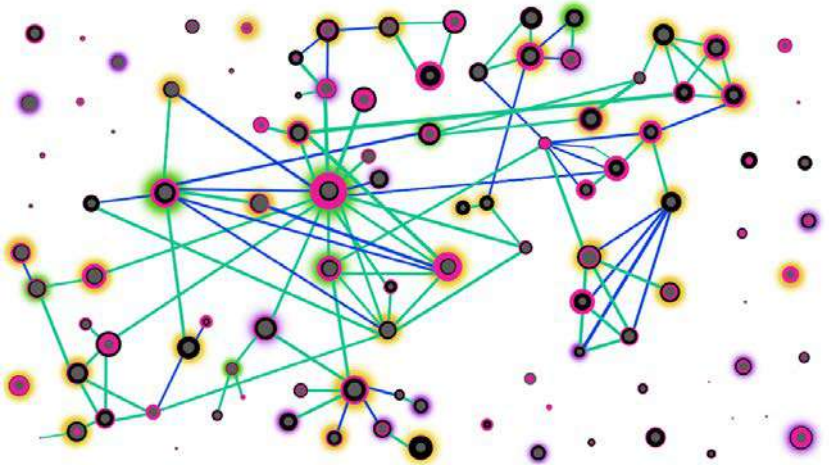
Note *: To provide information on the most influential groups identified by the activity, you can either fill in the three tables below or simply take a picture of the grid completed by community members and join it to this report.*

a **b**

Figure 4.1.1. Example of cards for social maps (a), protocol for social mapping (b)
Source: USAID (2012)

Group name	Gender	# of groups with whom the group interacts	Title of health worker(s) who are members of the group (if any)	Group supported by an NGO ?	Catalyzer name	Sex	Employment and level of education of Catalyzer	Catalyzer contact information
1.								
2.								
3.								
4.								
5.								

a



b

Figure 4.1.2. Example of a grid used for social mapping (a) and social map representing the social network (b)

Source: USAID (2012) -a, https://ballaratwellness.com/mapping_social_networks/ - b

Remarques/Notes: You may think, "We already know which groups and leaders are important in the area where we work." But as research shows that we often do not know who is important in terms of social connectedness and influence. These may be people whose importance comes from formal leadership positions, wealth, or other common markers of status. To successfully use a social networks diffusion approach, it is vital to work with groups and individuals whom communities judge to be socially influential. These people and groups are trusted entrées into the social networks that will spread new ideas and behaviours.

Source/further reading:

USAID (2012) Tékponon Jikuagou Guide to Social Networks Mapping: Reporting Tools. Available at: https://irh.org/wp-content/uploads/2017/04/Chapter_1_TJ_How_To_Guide.pdf
https://www.wvi.org/development/publication/social-mapping-tool

https://irh.org/wp-content/uploads/2017/04/Chapter_1_TJ_How_To_Guide.pdf

Tool: Focus groups

See Tool 1.14 Focus groups

Tool 4.2. Logical framework analysis

Main goal: To describe the logical linkages among project resources, activities, outputs, impacts achieved, and short, intermediate and long-term outcomes.

Format: Template

Outcomes: Diagram illustrating the relationship between the components of a project

Why to use this tool: Logic models can help educators plan and monitor program evaluations by exploring the relationships between program resources, activities, outputs, and outcomes, and representing them through diagrams. Educators can use these representations to determine the extent to which programs are having their intended effects.

(Who?) Actors involved: Team members

Group size: not preliminary defined

Facilitation level: medium

Level of expertise/Effort: middle

Time frame: not preliminary defined

Required materials: Logic Model worksheet

Steps:

1. Following the Logical Model worksheet, identify the components and characteristics of the program under analysis.

2. Use arrows to indicate relationships: they show how one program function affects another.

3. Use evaluation questions that may be associated with each component of the program.

4. Analyse the generated diagram

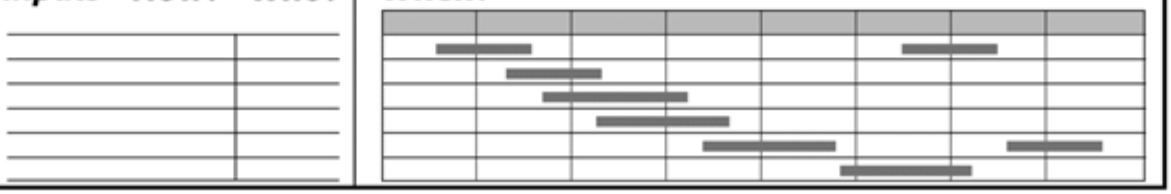
How it looks like/template: Templates of Figure 4.2.1 a-b represent the examples of developing a science program in elementary school to increase student academic achievement in science.

Remarques/Notes: -

Source/further reading:

https://www.sciencedirect.com/science/article/abs/pii/S0149718998000421
https://ies.ed.gov/ncee/edlabs/regions/pacific/pdf/REL_2014007.pdf
https://evaluationsupportscotland.org.uk/resources/interactive-logic-model-template/
https://knecnotes.com/logical-framework-approach-to-project-planning-and-design/

Objectives	Success Measures	Verification	Assumptions
Goal **Why?**			
Purpose **Why?**			
Outcomes **What?**			
Inputs How? Who?	**When?**		



a

	Project Narrative Summary	Objectively Verifiable Indicators (OVI)	Means of Verification (MOV)	Important Assumptions
GOAL: The higher level objective towards which the project is expected to contribute (mention the target groups)	Overall %, No. increase or decrease aimed	Measures (direct or indirect) to verify to what extent the goals is fulfilled	The sources of data necessary to verify the status of goal level indicators	Important events, conditions or decisions outside the control of the project which must prevail the goal
OUTCOMES: The effect which is expected to be achieved as a result of the project		Measures (direct or indirect) to verify to what extent the purpose is fulfilled	The sources of data necessary to verify the status of purpose level indicators	Important events, conditions or decisions outside the control of the project management necessary for achievement of the purpose
OUTPUTS: The results that the project management should be able to guarantee (mention target groups)		Measures (direct or indirect) to verify to what extent the outputs are produced	The sources of data necessary to verify the status of output level indicators	Important events, conditions or decisions outside the control of the project management necessary for the production of outputs
ACTIVITIES: The activities that have to be undertaken by the project in order to produce outputs		Goods, people and services necessary to undertake the activities	The sources of data necessary to verify the status of activity level indicators	Important events, conditions or decisions outside the control of the project management necessary for the start of the project

b

Figure 4.2.1. Template (a) and summary (b) of Logical framework analysis

Source: http://www.ikdoeprojecten.nl/page/logical-framework, https://knecnotes.com/logical-framework-approach-to-project-planning-and-design/

Tool 4.3. Beneficiary assessment

Main goal: Improve the impact of development operations by gaining insight into community perspectives through community-level group discussions and interviews in order to gain input from intended beneficiaries regarding a planned or ongoing intervention.

Format: Fieldwork and workshop

Outcomes: Report with relevant information about stakeholders

(Who?) Actors involved: Designer (s), facilitator(s), co-facilitator(s), stakeholders, other particular people or groups of people

Group size: not preliminary defined

Facilitation level: advanced

Level of expertise/Effort: intensive

Time frame: 8 to 12 months

Required materials: not preliminary defined

Steps: Different techniques.

1. Conversational interviews: In a well-guided and naturalistic interview people reveal their feelings, thoughts, and beliefs about a particular topic. This interview must be structured in a conversational format composed of a series of topics or themes directly related to the planned or ongoing interventions. Interviews can be carried out individually or in groups. Individual interviews allow greater flexibility and responses are not affected by suppressions or distortions produced by the presence of colleagues.

2. Focus group discussions: The interview is conducted with target communities in groups. This modality is useful for interviewing people from the same neighbourhood or people involved in obtaining the same livelihoods. The focus group makes it easy to collect data from a larger sample group at the same time but does not record precise attributions or individual details. The effective number of the group is 10 to 12 interviewees.

3. Direct observation and participant observation: Direct observation involves counting, noticing behavioural traits and patterns, and other facets of a particular developmental situation. It is the simplest technique and provides immediate results on the observed phenomena. The participation observations consider the prolonged residence of a researcher in a community of beneficiaries. During this time, a sufficient relationship is established with key members of the community of interest. The researcher engages in his daily activities in order to fully understand the living conditions of the selected beneficiaries. The researcher resides with the selected beneficiaries collecting information for one week to three months. These homes are visited many times during the researcher's stay in the community. Emphasis is placed on how the issues identified in the interview guide are affected by the sociocultural and political context in which the project beneficiaries live and work.

Benefits/Why to use this tool: It provides useful results to adapt and guide the contribution to development processes by knowing the community's perspectives on the effectiveness of a project and providing a basis for a meaningful response to their needs.

How it looks like/template: -

Remarques/Notes: It is a complex set of tools, it considers at least 7 steps depending on the technique used, and the required materials depend on that.

Source/further reading:

https://www.dmeforpeace.org/wp-content/uploads/2017/06/WB_Beneficiary20Assessment.pdf#:~:text=Beneficiary%20Assessment%20(BA)%20is%20a,a%20planned%20or%20ongoing%20intervention.

https://www.shareweb.ch/site/Poverty-Wellbeing/addressing-poverty-in-practice/beneficiary-assessment

https://documents.worldbank.org/en/publication/documents-reports/documentdetail/802501468739312293/beneficiary-assessment-an-approach-described

Tool 4.4. Define your indicators

e.g. indicators to define the type of collected data to understand the NBS impact over time.

Main goal: In order to understand an intervention's effectiveness, you must measure progress over time. Indicators define the data points that you will track, and they may be quantitative or qualitative depending on what you're trying to measure. You will need a mix of indicators that measure both how your intervention is being implemented as well as the progress being made in achieving short, medium and long-term outcomes. Here are some tips for defining meaningful, and measurable, indicators for your solution.

Format: Workshop and template

Outcomes: a set of defined process and outcome indicators to monitor and evaluate activity and thereon-based update your measurement plan

(Who?) Actors involved: Project team, monitoring and evaluation specialist

Group size: -

Facilitation level: advanced

Level of expertise/Effort: hard

Timeframe: 90 Minutes

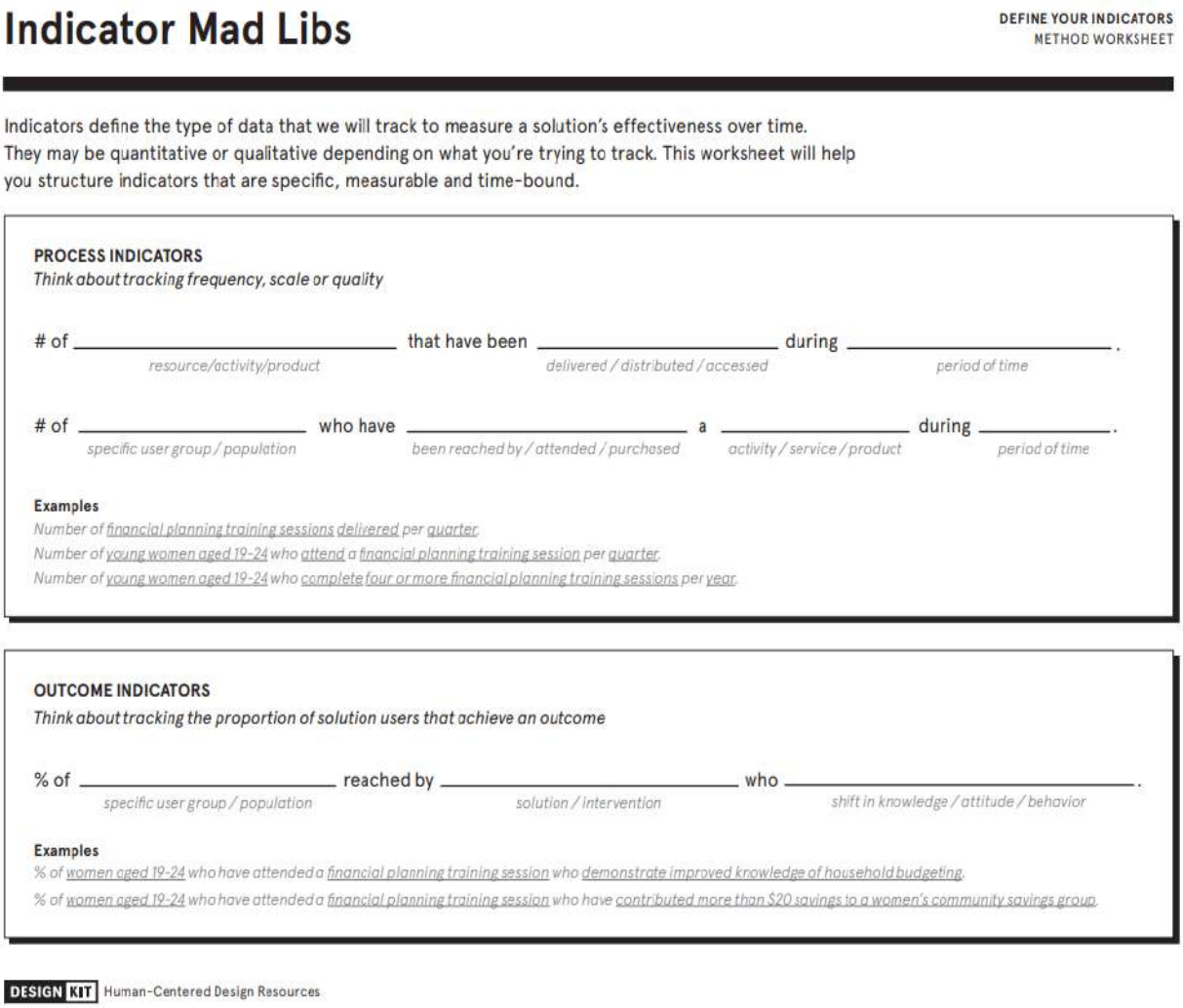
Required materials: Pens, paper, Logic Model

Steps:

1) The Logic Model that you developed earlier will be a valuable tool for you now, as it's essentially a blueprint from which to define indicators. Ask yourself, what is it that we need to learn or prove about this solution? This should inform what you decide to measure.
2) The first set of indicators that you will define are Process Indicators, which help to answer the question "Is my solution being implemented as planned?" These indicators will be measures of things that sit at the Input and Output level of your Logic Model, such as resources, activities, and user uptake. Make a list of the inputs and outputs that you want to track.
3) The second set of indicators are Outcome Indicators, which help to answer the question "Is my solution achieving its goals?" These indicators will be measures of things that sit at the Outcome level of your Logic Model, such as shifts in knowledge or behaviours. Make a list of the outcomes that you want to track.
4) Now it's time to get more precise. Use the Indicators Mad Libs worksheet to structure specific, measurable and time-bound indicators for your inputs, outputs and outcomes. Consider what you can actually track— qualitative stories from the people that you're designing for can be very powerful, especially where it's not possible or appropriate to capture hard numbers.
5) Go through your mad libs and prioritize a manageable set. Make sure it includes indicators for any targets your funder requires you to report to. Fill these into your Monitor and Evaluate activity and continue with the next stage of your measurement plan.

Benefits/Why to use this tool: Use this worksheet Indicator Mad Libs to structure specific, measurable and time-bound indicators for your inputs, outputs and outcomes. Consider what you can actually track— qualitative stories from the people that you're designing for can be very powerful, especially where it's not possible or appropriate to capture hard numbers.

How it looks like / template: see Figure 4.4.1.



Indicator Mad Libs

DEFINE YOUR INDICATORS
METHOD WORKSHEET

Indicators define the type of data that we will track to measure a solution's effectiveness over time. They may be quantitative or qualitative depending on what you're trying to track. This worksheet will help you structure indicators that are specific, measurable and time-bound.

PROCESS INDICATORS
Think about tracking frequency, scale or quality

# of _____ that have been _____ during _____.
resource/activity/product *delivered / distributed / accessed* *period of time*

# of _____ who have _____ a _____ during _____.
specific user group / population *been reached by / attended / purchased* *activity / service / product* *period of time*

Examples
Number of financial planning training sessions delivered per quarter.
Number of young women aged 19-24 who attend a financial planning training session per quarter.
Number of young women aged 19-24 who complete four or more financial planning training sessions per year.

OUTCOME INDICATORS
Think about tracking the proportion of solution users that achieve an outcome

% of _____ reached by _____ who _____.
specific user group / population *solution / intervention* *shift in knowledge / attitude / behavior*

Examples
% of women aged 19-24 who have attended a financial planning training session who demonstrate improved knowledge of household budgeting.
% of women aged 19-24 who have attended a financial planning training session who have contributed more than $20 savings to a women's community savings group.

DESIGN KIT Human-Centered Design Resources

Figure 4.4.1. Design-Kit template Indicator Mad Libs for Defining Indicators
Source: https://www.designkit.org/methods/define-your-indicators

Remarques/Notes: -

Source/further reading:

DesignKit (n.y.) Define Your Indicators. https://www.designkit.org/methods/define-your-indicators

Tool 4.5. Participant observation

Main goal: To collect detailed information about a community's habits, opinions and issues and with a view to developing planning and policies that better incorporate the community's needs and wishes.

Format: Fieldwork

Outcomes: Information about a community collected by a participant observer can ensure that planning and decision making incorporates community needs and opinions and will therefore be more acceptable and more useful to the community.

(Who?) Actors involved: Researcher, community members

Group size: 2-4 observers and community members (objects of observations)

Facilitation level: beginner

Level of expertise/Effort: easy

Timeframe: several hours during several weekdays and a weekend

Required materials: Field notebook, protocols, pen, computer

Steps:

1. Be clear about what the investigation is about and what aspects you will stay focused on during the activity.

2. Set Specific Goals - Create a list of things to pay attention to.

3. Be prepared with your field notebook

4. Focus on the planned scenario, but do not exclude those scenarios that you did not expect to find because they may suggest new directions for investigation.

5. Be discreet and use good judgment in determining whether to participate in certain types of activities and act naturally.

6. Take notes on what you think is appropriate for the study considering your expectations and interpretations.

7. After taking notes, consider expanding them into detailed descriptions using a computer.

8. Analyse and reflect on the notes generated

Benefits/Why to use this tool: The information retrieved using this tool serves as a check against the subjective report of the participants about what they believe and do, as well as to gain an understanding of the physical, social, cultural and economic contexts in which the study participants live.

How it looks like/template: Figure 4.5.1 indicates some particular aspects that the researcher should observe during the Participant Observation.

Category	Includes	Researchers should note
Appearance	Clothing, age, gender, physical appearance	Anything that might indicate membership in groups or in sub-populations of interest to the study, such as profession, social status, socioeconomic class, religion, or ethnicity
Verbal behavior and interactions	Who speaks to whom and for how long; who initiates interaction; languages or dialects spoken; tone of voice	Gender, age, ethnicity, and profession of speakers; dynamics of interaction
Physical behavior and gestures	What people do, who does what, who interacts with whom, who is not interacting	How people use their bodies and voices to communicate different emotions; what individuals' behaviors indicate about their feelings toward one another, their social rank, or their profession
Personal space	How close people stand to one another	What individuals' preferences concerning personal space suggest about their relationships
Human traffic	People who enter, leave, and spend time at the observation site	Where people enter and exit; how long they stay; who they are (ethnicity, age, gender); whether they are alone or accompanied; number of people
People who stand out	Identification of people who receive a lot of attention from others	The characteristics of these individuals; what differentiates them from others; whether people consult them or they approach other people; whether they seem to be strangers or well known by others present

Figure 4.5.1. Template suggesting what to observe during participant observation
Source: Mack et al., 2005

Remarques/Notes: The method is distinctive because the researcher approaches participants in their own environment rather than having the participants come to the researcher. The conclusions drawn by the researcher are highly dependent on the skills of the researcher and should be viewed within this context.

Source/further reading:

Mack C., Woodsong C., Macqueen K.M., Guest G., Namey E. (2005) Qualitative Research Methods: A Data Collector's Field Guide. Family Health International. Available at: https://www.researchgate.net/publication/215666086_Qualitative_Research_Methods_A_Data_Collector%27s_Field_Guide (accessed on March 21, 2021)

https://guides.library.duke.edu/ld.php?content_id=11691400

https://www.qualitative-research.net/index.php/fqs/article/view/466/996

https://www.betterevaluation.org/en/evaluation-options/participantobservation

https://instr.iastate.libguides.com/c.php?g=49332&p=318075

Tool 4.6. Transect walk

Main goal: A transect walk is a systematic walk along a defined path (transect) across the community/project area together with the local people to explore the environmental conditions by observing, asking, listening, looking and producing a transect diagram. The transect walk is normally conducted during the initial phase of the fieldwork. It is best to walk a route, which will cover the greatest diversity in terms of resources and infrastructure.

Format: Fieldwork

Outcomes: The information collected during the walk is used to draw a diagram or map based on which discussions are held amongst the participants.

When to use: The transect walk is normally done during the initial phase of the fieldwork. In other words: it is suitable for the initial phase of the project (to understand the NBS system: discover the area, needs, challenges, opportunities), but also for the middle stage of the project (to observe/monitor the NBS implementation) and for evaluation of NBS impact. The transect walk introduces the research team to the community and its inhabitants and is a way to collect (spatial) information about resources, challenges and needs for NBS. The walk can also be used to identify problems and opportunities e.g. regarding resource use and access to resources in the various parts of the transect visited. Through the direct field observation and exchange of information local community members learn to identify the problems which will gradually lead to the identification their causes and possible solutions.

(Who?) Actors involved: The transect walk is conducted by the research team and community members. The participants are groups of women and men (consider gender issues), who are willing to walk and talk amongst themselves and the facilitators through a transect walk.

Group size: from 2 onwards, up to 50 participants (otherwise split into several smaller groups)

Level of expertise/ effort: Easy to apply. The transect walk is conducted by the research team and representatives of the most important stakeholder groups. Thus, experience in conducting such field research is required.

Facilitation level: Good participatory facilitation skills and knowledge

Timeframe: 2-3 hours in average. If the walk is likely to take longer, the transect walk may be divided into segments, each assigned to a small team.

Required materials: *For the transect walk itself*: notebook and pen; appropriate clothing and footwear for the area and time of year; maps or aerial photographs if available, e.g. from Google Earth; if the details of the transect are to be incorporated into a GIS, (computerised Geographical Information System), you may take along a GPS (Global Positioning System) device (however, this is not necessary in most cases); you could also take along a camera to record certain things, or a voice recorder if you wish to interview somebody. *For the subsequent write-up*: large sheets of paper (see also managing flipcharts); colored pens; small colored cards for marking particular items of interest.

Steps:

1. *Identify a group of key informants*. Ideally, the participants should include all important stakeholder groups they should all be willing to walk some distance, and share their observations.
2. Discuss with the participants / key informants the purpose of the walk, and decide with them what parameters should be used for recording observations. Local definitions of these parameters should be explored. It is best to limit the parameters covered to five or six at maximum; trying to collect too much information may only result in confusion.
3. *Define the path (transect) across the community/project area* together with the local people to explore the NBS area conditions by observing, asking, listening, looking and

producing a transect diagram. By choosing a route, try to select those which will cover the greatest diversity regarding the challenges addressed by the NBS, resources, barriers and other relevant issues. The path should be taken to cover the full geographical variation in the area. The 'path' may not be a path at all – ideally, as a true cross-section, it should be a straight line. However, if the path roughly corresponds to at least part of the cross-section, it may be easier to use it. Maps or aerial photographs (e.g. from Google Earth) may be of use, if available, but are certainly not essential. For monitoring and evaluation purposes, it is important that the route of the transect walk can be easily found again and again, possibly after substantial periods of time.

4. During the walk, participants discuss everything encountered or noticed which could be of relevance to their NBS project.
5. In general, the easiest and most stimulating part of transect walks is the walk itself and the discussions that arise during it, with the local people as experts. Documenting it afterwards can be more difficult. It helps to clearly decide specific observation points along the transect walk at which everyone stops to record all parameters.
6. The team members facilitate these exchanges by asking questions and making observations. They also record the discussions/take notes. Furthermore, the team members can informally interview any people met during the walk to get their views on the resources and land use visible at that spot.
7. After the walk you produce and analyse a transect diagram, and ensure that a full discussion occurs with local analysts. In large areas where a transect walk would take longer to produce (for example, four or more hours), it might be sensible to divide it up into smaller transect segments that can be combined later.

1. Discuss aim

A transect walk can serve many functions. In some cases, an outside analyst is helpful for a technical perspective. In others, this activity can serve as a valuable resource when conducted by community residents alone.

The group should have a specific aim when undertaking a transect walk. Three examples including taking note of (1) soil and vegetation types at different points with the goal of increasing green space; (2) open sewage with the goal of brainstorming low-tech sanitation solutions; and (3) access to purchasing food with the goal of increasing this access at points of highest need.

Are you aiming to:

- Facilitate a conversation within a community about local behaviours and needs around a specific location?
- Have an outside researcher or technical expert learn about issues facing the community?
- Address one issue (sewerage, access to food)?
- Evaluate different areas for a possible intervention or project?

Transect walks can accomplish all of these and more. Before the walk, locals and any visitors participating should discuss what previous mapping has accomplished, if anything, and what this map aims to add.

2. Select local and technical analysts, and set a time

Identify members of the community knowledgeable about each area to be covered and with a variety of opinions and experiences, who are interested in conducting the transect walk, as well as those interested in analyzing the results of the walk. Identify outsider collaborators with

additional technical skills that may be useful, should these skills not be found among community members. Finally, identify a 3-hour period that serves all groups and when residents will be moving around the community and available for conversation.

3. Develop criteria for observation

Make a list of the information that should be gathered to meet the aim established in #1 (for example, if you are looking to install low-tech sewerage solutions, you will need to observe the locations of sewage in the street, possible drainage hazards, existing sewerage solutions that can be improved or serve as an example, and open space available for new installations). Here are other examples of things you may be looking for:

- Housing conditions
- Public transit access points
- Street commerce
- Non-governmental organizations, churches, and neighborhood institutions
- Public spaces
- Stores (e.g. pharmacies, grocery stores, open air markets)
- Sanitation (e.g. water, sewerage, garbage collection and blockage points)
- Location of health facilities
- Contaminated spaces

4. Create transect diagram

On construction paper, draw a horizontal line across the top. This line will pass through, or "transect," all areas of the community and in this way provide a representative view. Beneath the line on the left side of the page, write categories for all the things you'll be observing (e.g. open sewage, self-built sewerage solutions, unused buildings that could be repurposed). Decide which route makes the most sense for walking in order to include a representative sample of the targeted areas of the community.

5. Walk slowly and talk to people

During the walk, proceed slowly through the community. Stop either at set intervals (every 100 meters, for example), or at the center of each new zone, noting the distance from the last stopping point on the line on your map. All analysts should examine the area for the observation criteria (established in #3), stopping to talk with residents in the area who would like to contribute their opinions as well. It is important that everyone who wants to contribute be included.

6. Analyze diagram

This could occur on the same day as the walk, or on another occasion, and can involve more community members than participated in the walk itself. What were the findings of the walk? How do they relate to past conclusions, and to resident and external analysts' perceptions of the issues at hand?

7. Brainstorm available solutions

The transect diagram can be analyzed to make a simple record of resources and issues in a community. But if residents and collaborators are interested in discussing possible solutions to these issues, now is the time. Technical collaborators can prepare for this discussion with a chart of possible solutions and what resources each one requires (time, space, building materials, funding).

8. Take any necessary follow-up steps to pursue those solutions

If the group identifies some solutions they believe would be a good fit, it is the prerogative of the community analysts and the outside collaborators to take the appropriate follow-up steps. These could include doing paperwork for a government program, polling and mobilizing to see which residents want to be on local task forces, organizing to undertake improvements within the communities' capacity, fundraising, grant-writing, contacting local or distant material suppliers and partner organizations, and more.

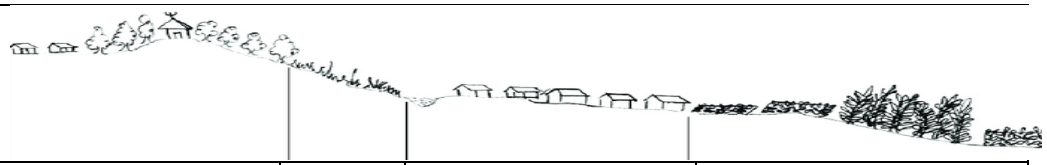
8. Document and leave results with community leaders

This research could be useful to future governmental, non-governmental, or community initiatives in the community and should be left with those responsible. All participants should leave their contact information for future inquiry.

Benefits / Why to use this tool:

- Transect walks help to identify and explain the cause and effect relationships among water uses, wastewater treatment and reuse and sanitation conditions.
- They help to identify major problems and possibilities perceived by different groups of local analysts in relation to features or areas along the transect.
- Transect walks provide you with an understanding about local technology and practices.
- Can support site selection (e.g. for a public toilet, a composting unit, etc.)
- Helps to triangulate data collected through other tools.
- Furthermore, transect walks can be used to compare reactions/discussions of different types of stakeholders (see stakeholder analysis starting by stakeholder identification/mapping factsheet), such as government officials, NGO team members, the local community, etc. In addition, these walks can provide a good cross-section of information that can be used for specific purposes of verification and appraisal.

Template / how it looks like: Inspiration can be found by field trip protocol (Figure 4.6.1).

(a) Transect (put here your case)				
Land use				
Water availability				
Soil				
Vegetation				
Problems				
Conflicts				
Resources				
Activities				
Perceptions				
Opportunities				


b

c

Figure 4.6.2. Example of Transect Walk template (a); locating transects with local experts in Leipzig, 2018 (b) and Malaga, 2019 (c)

Source: authors

Remarques/Notes: The observation protocol can be developed based on your main aim and design of the transect walk. This tool only considers the currently "observable" situation and features, serving as an entry point for more in-depth analysis. It might be impossible to bring together all the relevant actors for participating the transect walk. The information collected during the transect walk is used to draw a diagram or map and provides a basis for discussion amongst participants. It might be useful to have a list of key questions to guide a discussion about the information gathered during the transect walk. Key questions might include the following examples: outline the current conditions, resources, land use and land users, main challenges, what constraints or problems are in the different areas, what possibilities or opportunities are in the different areas, how will a proposed NBS implementation affect the features and characteristics of different areas. If local analysts have sufficient time, it might be useful to ask them to draw a series of diagrams to illustrate changes over time. If there are several different groups, ask each group to present its diagram to the others for their reactions and comments. Are there serious disagreements? If so, note these and if a consensus is or is not reached.

Source/further reading:

Keller S. (2020) Transect Walk. Factsheets. https://sswm.info/humanitarian-crises/urban-settings/planning-process-tools/exploring-tools/transect-walk

WORLD BANK (n.y). Tool name: Transect Walk. Washington, DC: World Bank URL. http://web.worldbank.org/archive/website01408/WEB/IMAGES/1_TRANSE.PDF [Accessed: 29.05.2021]

CatComm (n.y.). Community Mapping through Transect Walks. https://catcomm.org/transect-walk/

Mahiri, I. (1998), Comparing transect walks with experts and local people. IIED, London.

Transect walk. https://jliflc.com/wp-content/uploads/2019/06/Transect-Walk.pdf

Volunteer Service Overseas (VSO). Participatory Approaches: A facilitator's guide Tools, Part III Toolkit. 2009. http://www.cropwildrelatives.org/fileadmin/templates/cropwildrelatives.org/upload/In_situ_Manual/VSO_Facilitator_Guide_to_Participatory_Approaches_Tools.pdf

BSR's Participatory Learning and Action Toolkit (2012) https://herproject.org/files/toolkits/HERproject-Participatory-Learning.pdf

Tool 4.7. Auto-Photography / participatory photographs

Main goal: to encourage community members to take pictures of problems and potential solutions to them. Taking pictures has become something so integral our daily lives that it actually makes a lot of sense to transform photography into a method for participatory planning. One of the first steps when coming into a community as a planner is to identify problems, challenges and solutions as well as existing ideas together with the neighbours.

Format: Fieldwork

Outcomes: a set of pictures

(Who?) Actors involved: 1 (facilitator), in some cases the discussion with community members can be undertaken

Group size: 1 onwards

Facilitation level: beginner

Level of expertise/ effort: low / easy

Timeframe: 1-2 h

Required materials: camera, protocol with the indicated points for taking pictures, notebook

Steps:

1. The researcher or facilitator distributes cameras to some community members and asks them to take pictures of (for example):

– positive aspects in the neighbourhood

– negative aspects in the neighbourhood

– existing solutions for problems in the neighbourhood

– characteristics of the neighbourhood, for example social use of space

2. Typically, three pictures per aspects should be taken to have a limited number of materials. The researcher should follow up the pictures with individual and group interviews and continue with other participatory methods to make sure that the pictures represent a good cross-section of the neighbourhood. For example, a transect walk could follow the exercise of auto-photography or vice-versa.

Benefits/ Why to use this tool: By handing cameras over to neighbourhood members, the facilitator of the participatory methods symbolically hands over the power to decide what problems and solutions are or could be. This can reverse the usual relationship in research, where you try to impose a meaning on findings. Here, findings and their meaning are being explained to you by those who have been living in the neighbourhood for years. It helps you change your perspective of a neighbourhood and focus on a specific set of issues that you might not even see otherwise. For example, women and children will show very different problems in their pictures compared to young men. Older people will probably see a lack of accessibility as one problem, whereas family mothers might be concerned about the lack of a school or of health provision. Some people might see a fence as a solution to a perceived problem, while others might consider the same fence as a problem. It should be very interesting to get pictures of the same place from different people. Some neighbours will focus on social aspects, whereas others will show you the importance and the diverse use of ordinary spaces.

How it looks like / template: see Figure 4.7.1 a, b.

a **b**

Figure 4.7.1. Example of Auto-photography (**a** – the photographer collects the data on public park infrastructure for further analysis of recreational space and structural diversity of the park; **b** – the photographer focuses on the vegetation species changes taking pictures to assess its morphological and ecological characteristics;)
Source: authors

Remarques/notes: Auto-photography is therefore very helpful in starting a discussion before even starting to decide on any planning measures. You can easily combine it with other methods such as transect walks or participatory mapping. It is important that you as a facilitator make sure that participants are safe and that the pictures, which might be published in a community exhibition, follow ethical guidelines: To be on the safe side, don't show any faces or anything too personal without permission. For this exercise to really work, you need a trusting environment, so ideally you already know the neighbourhood and the people already. Otherwise, they might not take this exercise seriously or they might want to disguise problems. Another complication could be the distribution and collection of cameras – with limited funds, you will only be able to distribute a certain number of cameras and a lot of people might want to participate. They might also want to keep the cameras afterwards. Make sure to find a good solution for these challenges before starting the project!

Lastly, when the exercise is finished, it is important to print out a set of pictures and hand them over to those who took them, since they own the copyright to their work!

Aside from some methodological, analytical and ethical challenges to overcome, this exercise is an important element in a set of many participatory techniques.

Source/further reading:

Photovoice (n.y.) Ethical photography for social change. https://photovoice.org/

Lombard, M. (2013) Using auto-photography to understand place: reflections from research in urban informal settlements in Mexico. Area 45:1, 23-32.

Noland, C.M. (2006). Auto-Photography as Research Practice: Identity and Self-Esteem Research Journal of Research Practice, 2 (1).

Geo-Mexico (2014) Qualitative fieldwork methods: auto-photography. January 13, 2014. https://geo-mexico.com/?p=10795

Tool 4.8. Field trips

Main goal: Field trips are significant and essential activities designed to offer additional learning experiences. They are not isolated events but are an integral part of the instructional process. Field trips topics and other interests enhance participants knowledge and understanding.

Field trip is an educational procedure by which the participants obtain first-hand information by observing places, objects, phenomena and processes in their natural setting. Field trip is a method for gaining rich insights into peoples' uses of and attitudes towards particular issues / challenges in real-world settings. In a short amount of time (one or two days), field trips sensitize design teams to the priorities of stakeholder groups.

Format: Fieldwork

Outcomes: Fieldwork protocols as a source for further analysis

(Who?) Actors involved: leaders & sub leaders (mostly, locals who are native for the field trip environment), different stakeholders.

Group size: Adequate supervision must be provided. The ratio of field trips participants to organizators/leads and responsible varies according to the aim of the trip. The average number of participants in one group is up to7.

Level of expertise / Effort: low-middle

Facilitation level: medium

Timeframe: one-two days

Required materials: diary, pens/pencils to record the observations made in the field trip, maps, other resources like camera, recorder, laptop.

Steps: *Before the field trip:*

1. *Organizational planning before field trip.* The field trip must be planned to meet specific project related objectives:
    a) Plan field trip with a specific checklist (permission, transport, booking boarding, safety & emergency arrangements).
    b) Plan a schedule & route plan for the field trip.
    c) Identify leaders & sub leaders. Assign responsibilities to individuals and make them understand their role.
    d) Have list of all candidates, contact numbers of people to be contacted in case of emergency & special needs.
    e) Submit report on field visit and analyse.

2. Preparing the plan for exploring/ learning / informing from the field trip:
    a) What will be learned/discovered/studied?
    b) What methods will be used?

3. Identify potential field trip route, obtain permissions (if needed) and arrange transportation:
    a) Look for the places that match exploring/learning objectives, its relevance, affordability & feasibility.
    b) Places of visit could be indicated on the map to be taken in the field.
    c) Contact with the administrative authority in order to obtain written permission from relevant authorities (if needed) and fix the visit date(s) well in advance (include it in the time table).
    d) If the location cannot be reached by walking, arrange transportation (bus / van / car(s)) according to the number of field trip participants; fix and communicate the time for departure from the starting point & communicate it to the participants.

e) A visit to the site is required for lead/sub-lead/organizators before the field trip to become familiarized with the location and any changes occurred.

Develop a field trip protocol to collect the valuable information (see template examples below).

During the field trip:

1. Badges with personal names or NBS project names /short contact information would be good.
2. Divide the field trip participants into small groups (up to 7 people) and assign sub-leads to each group.
3. Take field trip bag with emergency cards, first aid kit and any other necessary supplies.
4. During the trip, make sure participants have enough time to observe, ask questions, and work on assignments.
5. Fill in the field protocols developed during the preparational stage.
6. Video conferencing is an excellent way for non-participants of the field trip to experience locations that may be otherwise unreachable. Programs such as Skype can connect field trip participants and the stakeholders/project partners from remote places by introducing them to different environments, cultures and experiences.

After the field trip:

1. Immediately after the field trip, leaders/organizers capitalize on what exploring/studying/learning in trip has taken place and make a thank you note when appropriate.
2. The field trip leader should evaluate the field trip within 48 hours after its completion.
3. Report all the notable things / issues discovered during the field trip according to the plan developed before the trip.

Benefits/ Why to use this tool:

- It provides an opportunity to get first-hand information from natural settings /real life situations.
- It supplements other sources of information.
- It serves as a pre-view of a background information and gather instructional material.
- It helps to verify previous information, discussion & to conclude individual experience.
- It allows to create situational experience for cultivating observation, keenness and discovery to serve as a means to develop positive attitudes, values and specific skills.
- It gives natural stimulation and motivates the participants to be more interactive and creative.
- It helps participants discover / explore things very quickly and remember them for longer of time.
- It provides an opportunity to solve the individual's problems by interacting with a group in a natural setting (in case of conflict of interests or situation with lack of communication /networking between the different stakeholders).

How it looks like / template: see Figure 4.8.1-4.8.2.

a

FIELD TRIP PROTOCOL
Participant name

To	
From	
Date	

Field trip overview

Travel destination	
Travel period	
Group of participants	
Main aim / purpose	
Specific objectives	
Key activities undertaken (e.g. observation, surveying, monitoring, etc.)	
Description of findings	
Main things I learned	

SUMMARY

Place visited	**Particulars, remarques and comments**

Take-home messages

Figure 4.8.2. Example of field trip realization (a) and protocol (b)
Source: authors, own creation

Source/further reading:

Eden G., Sharma S., Roy D., et al. (2019) Field trip as method: a rapid fieldwork approach. IndiaHCI '19: Proceedings of the 10th Indian Conference on Human-Computer Interaction, 1–7. https://doi.org/10.1145/3364183.3364188
Randall D., Harper R., Rouncefield M. (2007) Fieldwork for Design: Theory and Practice. Springer-Verlag London.
Greene, K., Bowen, J.P., Brian, D. H. (2015) The Educational Value of Field Trips. Education Next. Retrieved 4 March 2015.

Tool 4.9. Ethnographic fieldnotes

Main goal: To record any observations or interviews carried out in the process of ethnography. Fieldnotes are the data source in ethnography.

Format: Fieldwork

Timeframe: time consuming (from one to several days/weeks)

Group size: 1-2 people from the team

Facilitation level: beginner

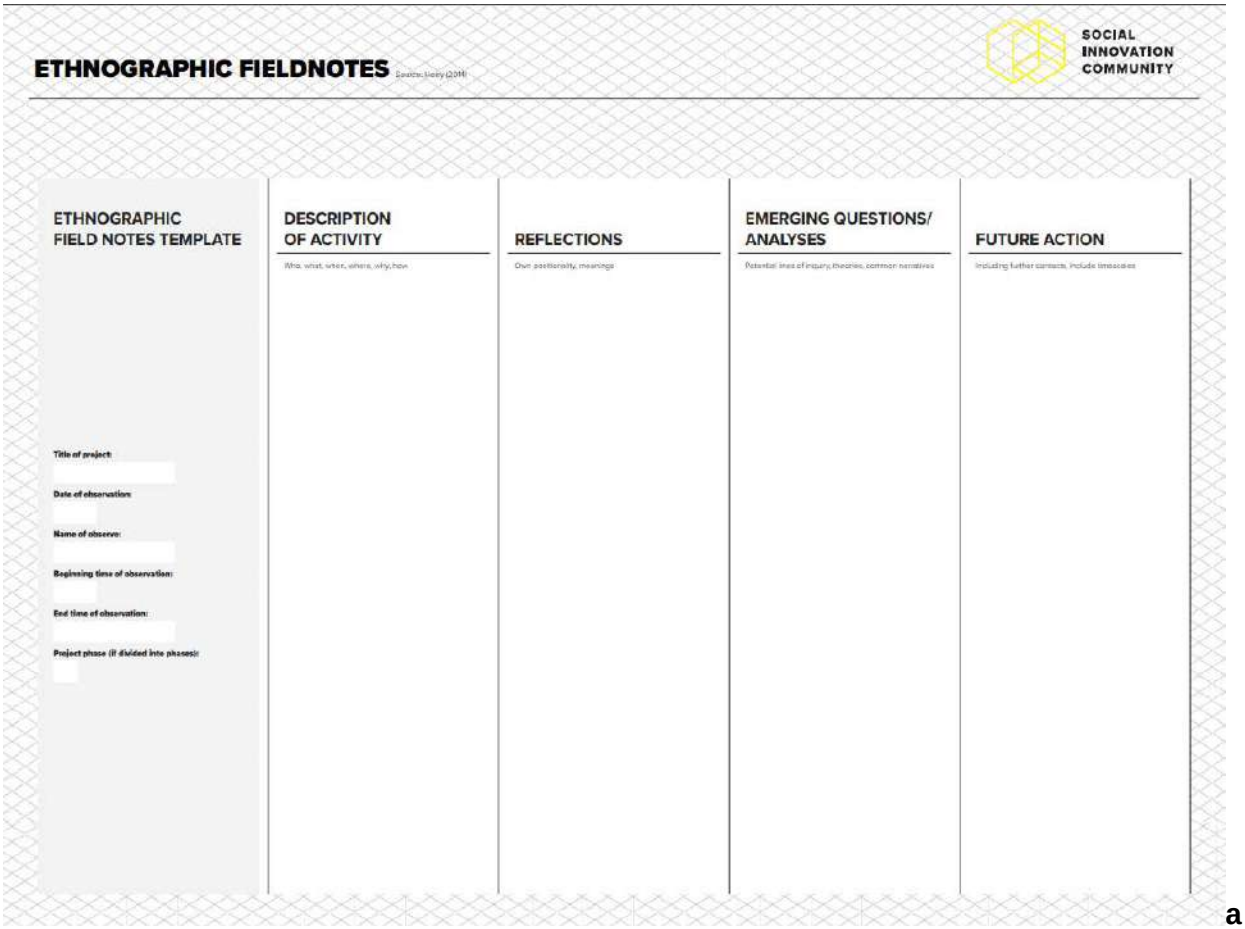
Level of expertise/effort: low / easy

Required material: ethnographic fieldnotes protocols, pens

Steps: follow the structure given in the template

Benefits/Why to use this tool: Field notes can be quite time consuming but are an essential part of ethnography. A rough guide is that the notes will probably take roughly the same amount of time as the encounter being recorded (i.e. if a researcher had done two hours of observations it would likely take two hours to write up.). This is a guide for an individual researcher or a group of researchers to use during and after any observation or interview. It is good practice to separate the emic (what people said/ did) from the etic (What you inferred from that) for the purposes of analysis.

Template / how it looks like: see Figures 4.9.1 a, b.



a


b

Figure 4.9.1. Example of ethnographic fieldnotes protocol (a) and taking ethnographic notes in the field (b)

Source: https://www.silearning.eu/wp-content/uploads/2017/04/ethnographic-fieldnotes.pdf (a) and authors (b)

Remarques / tips: Ethnography is an iterative approach. You will want to come back to fieldnotes as you learn more about your chosen community and see how your own understandings have changed.

Source/further redaing:

Hoey B.A. (2020) Doing Ethnography to Connect, Exchange, and Impact. In: Reinventing and reinvesting in the local for our common good. Newfound Press, University of Tennessee. 59-98.

Hoey B.A. (2014) A simple introduction to the practice of ethnography and guide to ethnographic fieldnotes. Marshall University Digital Scholar. Available at: https://www.cedarnetwork.org/wp-content/uploads/2016/06/Wasserfall-Intro-to-ethnography.pdf (accessed on May 22, 2021)

https://www.silearning.eu/wp-content/uploads/2017/04/ethnographic-fieldnotes.pdf

Tool 4.10. Ethnographic observation

Main goal: A tool to help understand context and to show what people do. It is about getting a perspective or opinion on what is happening, what's going on, who you'd like to spend more time with.

Format: Fieldwork

Outcomes: filled ethnographic observation templates as a base for further analysis of the local settings and context

(Who?) Actors involved: researchers, volunteers

Group size: min 2 people

Facilitation level: beginner

Level of expertise / Effort: Medium

Timeframe: min 2 hours

Required materials: Field note template/ notebook and pen

Steps: follow the instructions in the template below

Benefits/Why to use this tool: better understanding of the local context, perspectives or opinions on what is happening, what's going on, who you'd like to spend more time with.

How it looks like / template: see Figure 4.10.1.

Remarques/Notes: This is an activity for an individual researcher or a group of researchers to use within their chosen setting (e.g. a town, organisation or group). It is likely to take more than one observation to get a complete picture and observations may change as more is learned about the group/ place being observed.

Source/further reading:

Spradley, J. P. Participant observation. New York: Holt, Rinehart and Winston.

https://www.silearning.eu/wp-content/uploads/2017/04/obversation-of-context.pdf

Figure 4.10.1. Ethnographic observation protocol

Source: https://www.silearning.eu/wp-content/uploads/2017/04/obversation-of-context.pdf

Tool 4.11. Participatory mapping

Main goal: using participatory mapping, you can combine the results of auto-photography and transect walks into a great visualization of the urgent urban planning issues in a neighbourhood.

Format: Fieldwork and visualisation / template

Outcomes: visualisation of results of discussions, of transect walks or of auto-photography.

(Who?) Actors involved: members of internal team observing the local settings

Group size: 1-3 people

When to use / Applicability: participatory mapping suits well as a decision support instrument for the following situations:

- Visually displaying scenarios will enhance stakeholder understanding and awareness.
- Visually displaying alternative solutions will provide stakeholders with an opportunity to provide feedback.
- The process can enhance other stakeholder-engagement methods—for example, during a focus group to help visualise issues and resources and thereby stimulate discussion.
- The process will help develop solutions and alternatives generated by stakeholders.
- The maps can help fostering a more holistic or ecosystem approach by educating stakeholders about the issues and interrelationships of resources outside their immediate areas of concern.
- It allows an outsider (e.g. a planner, a consultant, an external expert etc.) to get a quick but comprehensive overview.
- It often makes sense to combine participatory mapping with other methods and tools supporting the decision-making process such as: mind mapping, brain storming, rich picture, nominal groups, problem tree analysis, etc.

Facilitation level: beginner

Level of expertise/Effort: low

Timeframe: from several hours to several days a week (preferably on the weekdays and weekend) (may be time consuming)

Required materials: participatory mapping protocols, pens, laptop with the excel tables, map with the selected positions/points for observations

Steps:

Step 1. Ask the individual or the group to draw the boundaries of the geographic unit being discussed.

- Participants or the planner can decide how they want to represent this – on paper with writing or using local materials such as wet sand and earth with sticks, stones or seeds.
- Remember that whatever material is chosen, you will always need a paper-based copy to enable comparative analysis.
- If it adds to the discussion, three-dimensional elements can be added, transforming the map into a model that emphasises landscape-level aspects of issues.
- This base map can be multiplied and used for different contexts.

Step 2. On whatever medium is chosen, ask the participants to draw the outline of the local area, for example, roads, towns, rivers and property boundaries.

- One way to do this, if you have the proper resources, is to project an overhead map onto a large sheet of paper and then to trace the required information.

Step 3. Having prepared the map, which could be as large as a wall, people can then add their information either directly or by using sticky notes. Let them record what is most significant to them, and then ask for more detail if something you are interested in is missing. Motivate all the people present to add their perspective, without influencing them too much. (See also: facilitators role.). To gain the most important information about the system of interest, use the following guiding questions and motivate people to add the missing information:

- Which are the problems (see situation and problem analysis category on Decision Making section) a community is confronted with (related to water or sanitation)?
- Where are these problems located?
- Where are the hotspots of these problems? Which are the worst?
- Potentially: Who is responsible for these problems?
- Are problems connected to each other? How do the problems influence each other?
- Are there good examples?

Step 4. Several modifications to the map may be needed before those involved are happy with the final result. Include additional written comments such as quantities of interest, if necessary.

Step 5. This map, representing the current state of affairs may be used later to make comparisons.

Participatory mapping is hence a very useful tool to get a first overview of where the largest problems and hotspots in regard to sustainable sanitation and water management are. It allows both local stakeholders and external planners to explore a current situation in a simple, but comprehensive way.

Benefits/Why to use this tool: Maps are a great instrument to understand many different aspects of a neighbourhood or even just a street. If you are undertaking a participatory process with community members, it is important to visualise all the ideas and results of your discussions in a concise and creative manner. This is where maps come in, because they can show so many issues at one glance and also include the geographical information that is important. See https://parcitypatory.org/2018/02/06/participatory-mapping/

- Clearly showing any information that is relevant to the community
- Attractive and accessible visualisation
- Showing local knowledge and culture
- Pin-pointing crucial aspects
- Important part of an urban planning strategy
- Free, creative use of any media

How it looks like / template: see Figure 4.11.1.

Figure 4.11.1. Participatory mapping on site
Source: own photo

Remarques/Notes:

- Might be easier to apply in a rural context with tight-knit communities and people who have more time on their hands
- Not accessible to illiterate (or map-illiterate) people
- Potential conflicts can prevent agreement upon boundaries
- Of course, every map will look very different and will be very subjective as well. However, in the spirit of participatory methods, it is crucial to ask the experts about their own neighbourhood – the people who live there! Their maps will not be perfect and probably not very accurate either, but they will reflect urgent issues and the gist of the neighbourhood much more than any conventional map. Use other participatory methods in combination with mapping and try out innovative ways of creating a map as unique as its neighbourhood!

Source/further reading:

Corbet J. et al. (2009) Good practices in participatory mapping. A review prepared for the International Fund for agricultural development –(IFAD). https://www.ifad.org/documents/38714170/39144386/PM_web.pdf/7c1eda69-8205-4c31-8912-3c25d6f90055

parCitypatory (2018) Participatory Methods: Mapping. February 6, 2018. https://parcitypatory.org/2018/02/06/participatory-mapping/

Tool 4.12. PPGIS (Public Participatory GIS)

Main goal: Public Participatory GIS (PPGIS) is a participatory approach to spatial planning and spatial information and communications management. It combines Participatory Learning and Action (PLA) methods with geographic information systems (GIS). PPGIS combines a range of geo-spatial information management tools and methods such as **sketch maps, participatory 3D modelling (P3DM)**, aerial photography, satellite imagery, and global positioning system (GPS) data to represent peoples' spatial knowledge in the forms of (virtual or physical) two- or three-dimensional maps used as interactive vehicles for spatial learning, discussion, information exchange, analysis, decision making and advocacy.

PGIS practice is geared towards community empowerment through measured, demand-driven, user-friendly and integrated applications of geo-spatial technologies. A good PGIS practice is embedded into long-lasting spatial decision-making processes, is flexible, adapts to different socio-cultural and bio-physical environments, depends on multidisciplinary facilitation and skills and builds essentially on visual language. The practice integrates several tools and methods whilst often relying on the combination of 'expert' skills with socially differentiated local knowledge. It promotes interactive participation of stakeholders in generating and managing spatial information and it uses information about specific landscapes to facilitate broadly-based decision-making processes that support effective communication and community advocacy.

If appropriately utilized, the practice could exert profound impacts on community empowerment, innovation and social change. More importantly, by placing control of access and use of culturally sensitive spatial information in the hands of those who generated them, PGIS practice could protect traditional knowledge and wisdom from external exploitation.

Format: Fieldwork and Visualization

Outcomes: academic practices of GIS combined with mapping to the local level helping to promote knowledge production by local and non-governmental groups; produced social maps based on the digital maps, satellite imagery, sketch maps and other tools

(Who?) Actors involved: Researchers, community members. The practice is multidisciplinary and relies on the integration of “expert” knowledge with socially and gender-differentiated local knowledge. It builds on high levels of stakeholder participation in the processes of spatial learning, decision-making, and action and brings together diverse groups of stakeholders from community-based and non-governmental organizations, technical agencies, and policymakers to exchange ideas, perspectives, and information on a more even playing field. This process thus strengthens and builds new relationships to support practical and inclusive decision-making and implementation of adaptation measures.

Group size: 1-2 researchers and observers (volunteers)

Facilitation level: medium

Level of expertise/Effort: middle to high

Timeframe: from several min to hours per observation (if applying app) during several weeks and months to collect monitoring data

Required materials: Apps, Field notebook, pen, computer

Steps: See Figure 4.12.1. PGIS is the practice of gathering data through traditional methods such as interviews, questions, and focus groups and by using paper maps to record spatial details. This information is then digitized so that it can be analyzed and interrogated using computer GIS software, and results can be communicated using computer-drawn maps.

Methodology for Participatory GIS Risk Mapping and Citizen Science can be found in Canevari et al. (2015) – see Fig. 95a, and Onencan et al. (2018). Designing Public Participation described in detail by Jankowski (2011), Mukherjee (2015), Rambaldi et al. (2006) and Sieber (2006).

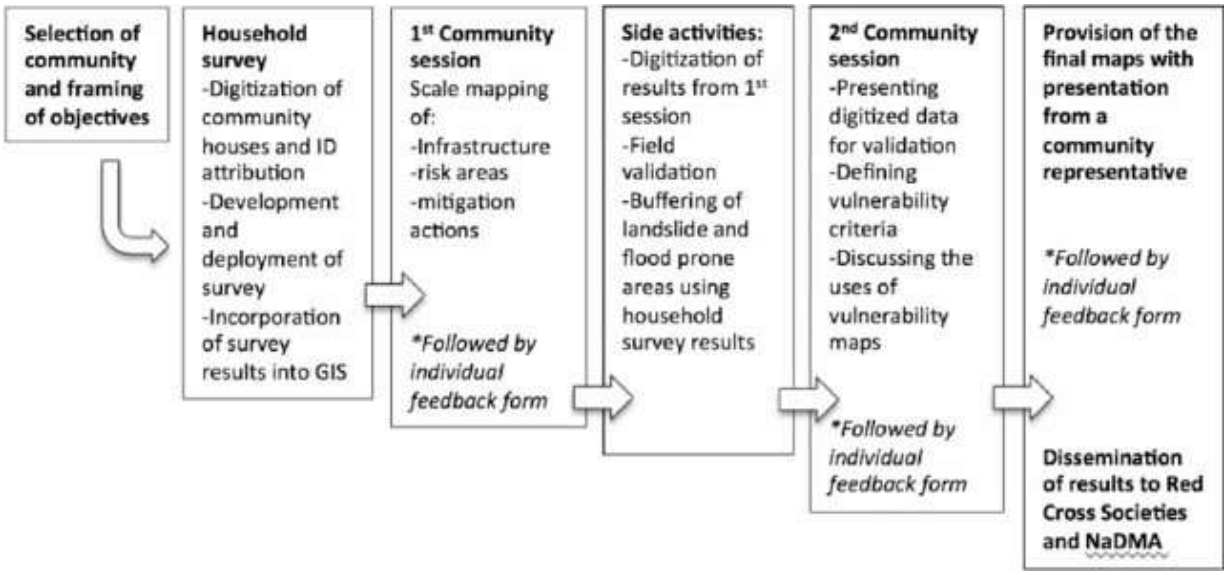


Figure 4.12.1. PGIS step-by-step methodology
Source: Canevari et al. (2015)

Benefits/Why to use this tool: PPGIS implies making geographic technologies available to disadvantaged groups in society in order to enhance their capacity in generating, managing, analysing and communicating spatial information. It helps to represent peoples' spatial knowledge in the forms of (virtual or physical) two- or three-dimensional maps used as interactive vehicles for spatial learning, discussion, information exchange, analysis, decision making and advocacy. It contributes to empowerment and inclusion of marginalized populations, who have little voice in the public arena, through geographic technology education and participation.

How it looks like/template: see next page (Figure 4.12.2)

Remarques/Notes:

Source/further reading:

Canevari L., Bastide J., Choutet I., Liverman D. (2015) Using partial participatory GIS in vulnerability and disaster risk reduction in Grenada. September 2015Climate and Development 9(2):1-15. DOI: 10.1080/17565529.2015.1067593

Jankowski P. (2011) Designing Public Participation Geographic Information Systems. In: The SAGE Handbook of GIS and Society. https://dx.doi.org/10.4135/9781446201046.n18

Mukherjee F. (2015) Public Participatory GIS. Geography Compass 9, 7, 384-394. https://doi.org/10.1111/gec3.12223

Onencan, A.M.; Meesters, K.; Van de Walle, B. (2018) Methodology for Participatory GIS Risk Mapping and Citizen Science for Solotvyno Salt Mines. Remote Sens., 10, 1828. https://doi.org/10.3390/rs10111828

Rambaldi G., Chambers R., McCall M., Fox J. (2006) Practical ethics for PGIS practitioners, facilitators, technology intermediaries and researchers. PLA 54:106–113, IIED, London, UK.

Sieber, R. 2006. Public Participation and Geographic Information Systems: A Literature Review and Framework. Annals of the American Association of Geographers, 96/3:491-507

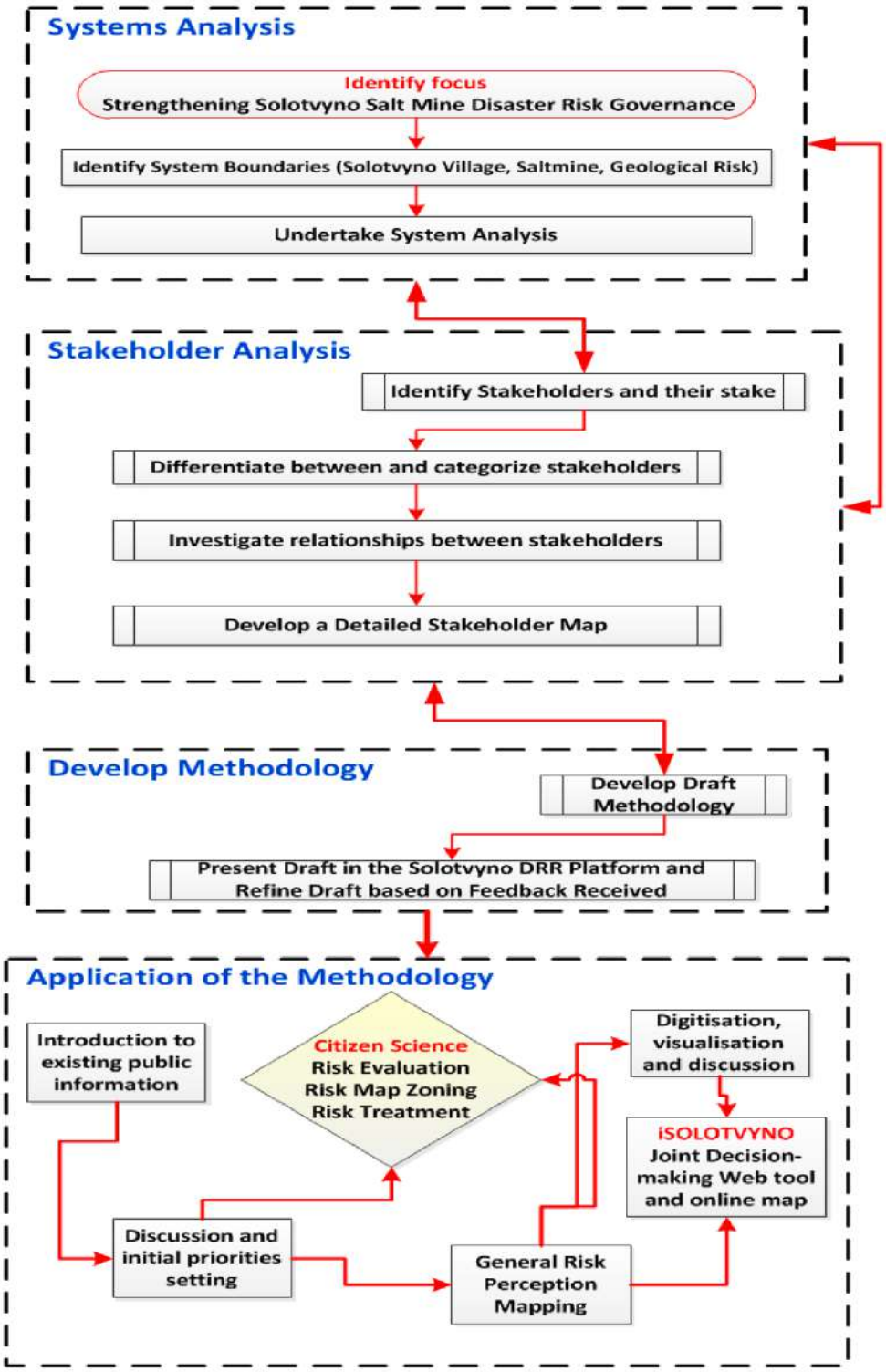


Figure 4.12.2. Methodological steps for system and stakeholder analysis and methodology for Participatory GIS Risk Mapping and Citizen Science

Source: Onencan et al. (2018)

Tool 4.13. Geoquestionnaire survey

Main goal: to measure spatial attributes that are subjective in nature, and based on respondents' local knowledge, experience, perception, and opinion.

Format: Visualization and communication (web-based)

Outcomes: Data on spatial variables collected with geo-questionnaires and other PPGIS methods typically fall into four broad and mutually related categories:

1) *Patterns of spatial behaviour* - it usually refers to visited locations, such as workplaces, services, or venues for leisure activities. Additional attributes may include travel modes used to reach a destination, routes taken, and the frequency of visits. Residential location is a related type of spatial variable that falls under the category of spatial behaviour. The location of residence is often used to provide implicit spatial reference for other non-spatial data collected with geo-questionnaires. These data have been used in transportation planning, mobility research and place-based health and wellbeing studies.
2) *Values and valuable places* – represent places and areas that are valuable for aesthetic, spiritual, recreational, cultural, social or other reasons. They may be inherently subjective and based on experiences (e.g. scenic or therapeutic values) or represent phenomena measurable with other methods (e.g. ecological or economic values). Related spatial variables include cultural ecosystem services, landscape attractiveness, and use values. The perceived value of places may be also indirectly derived from the patterns of use collected with geo-questionnaires.
3) *Experiences and subjective evaluations* – include past experiences, memories, and emotions associated with locations, as well as evaluations of perceived environmental quality. In softGIS methodology, such evaluations are either positive or negative and are grouped into the categories such as functional, social, aesthetic, and related to place atmosphere.
4) *Development preferences* – represent locations and areas where development is deemed favorable or unfavorable by the geo-questionnaire respondents. Preferences may be expressed by map sketches, markings, and statements related to specific categories (e.g. housing, tourism, green areas, industrial development) or general (e.g. this area should be protected from any development). Spatial variables may also represent specific locations where a certain type of development or service should be located according to respondents (e.g. where to locate a bus stop or a playground), locations that should be improved, or objects that should be removed according to respondents. Preference variables may also pertain to specific development proposals presented in geo-questionnaire as interactive map layers.

(Who?) Actors involved: team members, GIS experts, local inhabitants as respondents of the questionnaire

Group size: not preliminary defined (large group)

Facilitation level: medium

Level of expertise/Effort: high

Timeframe: from several minutes per respondent to reply on the questions to several days to analyse the data

Required materials: GIS software, Data collected with a geo-questionnaire can be analysed and visualised in GIS using a variety of methods. Participant attributes may be georeferenced using their residential locations, and analysed similarly to other geodemographic data.

Steps:

A Socialpinpoint webpage (Figure 4.13.1) navigates how to use GeoSurveys in projects with multiple projects/concepts on the one map

(see https://help.socialpinpoint.com/en/articles/5112498-geosurvey-multi-project-application).

1. Log in to your Social Pinpoint Admin site.
2. Create a new project or open and existing project.
3. Choose the initial view of your project. In this case we have selected a park and have drawn a boundary around out project area.
4. Create your layers for each concept. In this case we have added two park layouts as an image format.
5. Create two new side bar buttons to allow the user to switch between the two projects.
6. Select GeoSurveys from the Tools Setting menu on the left.
7. Click New GeoSurvey or edit an existing entry.
8. Filter markers by GeoSurvey step: Enables the ability to associate comments dropped to the particular GeoSurvey Step they were dropped on.
9. These comments are then NOT visible when looking at another GeoSurvey step. This is particularly useful for projects that want to display multiple design options as you can now clearly show what comments are associated with what design option. Switching between design options will change to the set of comments specific to that design option (Note: You can only create one GeoSurvey workflow per project. You must save the GeoSurvey before adding workflow steps).
10. Click Add New GeoSurvey Step – add questions and Update GeoSurvey to save.
11. Link GeoSurvey step to Survey Submit: Edit an existing Survey and set the Survey submit action to Submit then Navigate to GeoSurvey Step, then select the desired to to be displayed on submitting.
12. Start the survey by inviting respondents through various channels (social media, advertisement, snow-ball methods, public/social events, local stakeholders' networks, ...).
13. Analyse the data.

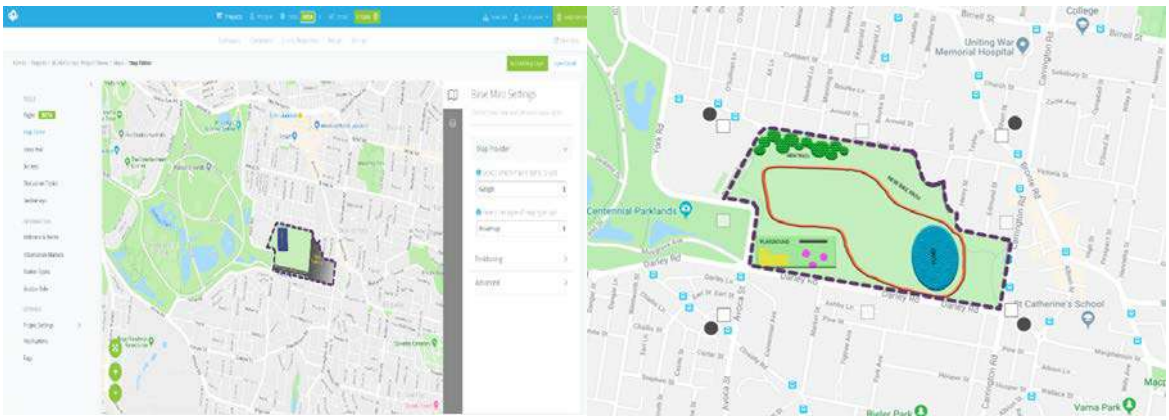


Figure 4.13.1. Example page of navigating steps of organising geoquestionnaire survey
Source: https://help.socialpinpoint.com/en/articles/5112498-geosurvey-multi-project-application

Benefits/Why to use this tool: The method allows to simultaneously collect qualitative, quantitative and spatial data from relatively larger population samples than during face-to-face meetings. They differ from other methods in that they provide geographical context for surveys and offer functionalities enabling the input of geographic objects, i.e. points, lines and/or polygons by respondents. Geoquestionnaires typically contain multiple pages of which some are complemented with an interactive map, i.e. a map that, at a minimum, allows for panning and zooming. The data are usually contributed online in an individual unsupervised setting, but it is also possible to use geo-questionnaires in a group and/or supervised setting.

How it looks like/template: see Figure 4.13.2.

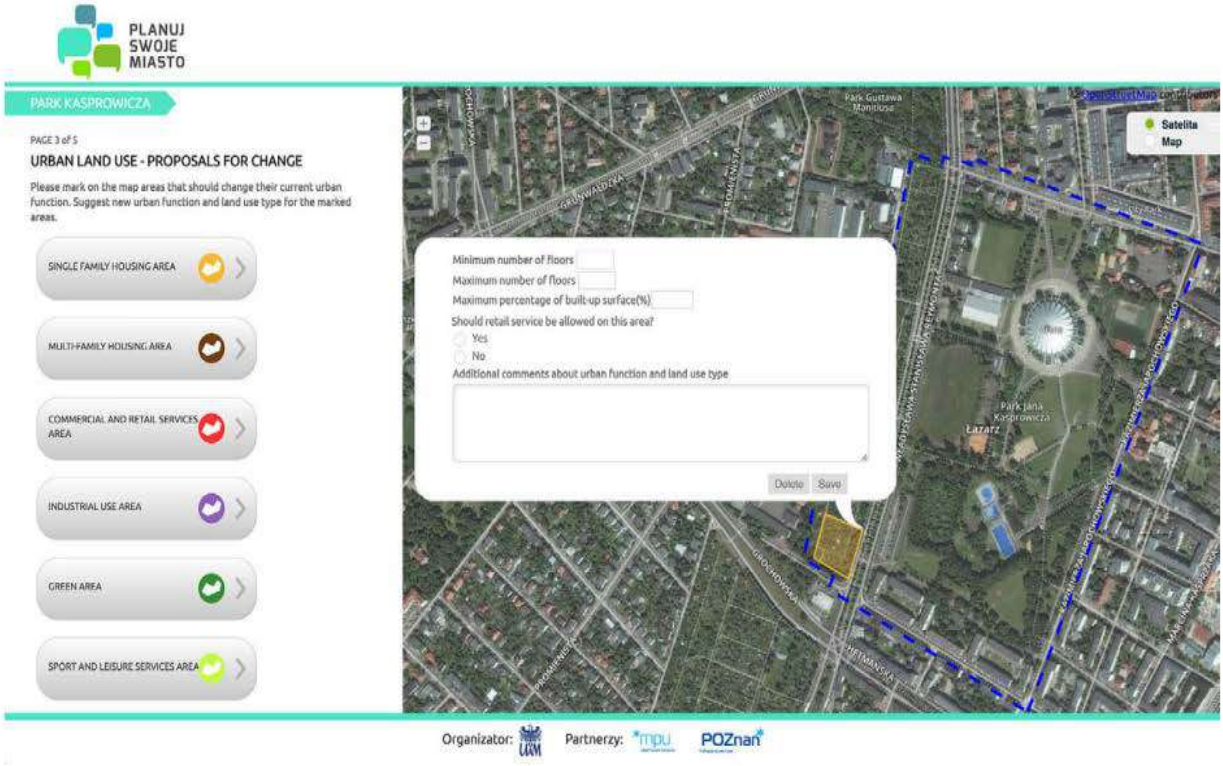


Figure 4.13.2. Example page of a geo-questionnaire used in Kasprowicz Park case study in Poznan, Poland (the mapping tools on the page allow respondents to sketch polygons representing their development preferences and answer questions about preference details. The geo-questionnaire interface allows the respondents to toggle between a satellite image and a street map, pan and zoom)
Source: Czepkiewicz et al., 2018

Remarques/Notes: The method requires expert knowledge in organizing the survey (web-based and GIS) as well as data analysis.

Source/further reading:

Czepkiewicz M., Jankowski P., Zwoliński Zb. (2018) Geo-questionnaire: a spatially explicit method for eliciting public preferences, behavioural patterns, and local knowledge – an overview. Quaestiones Geographicae 37(3), 177–190.

Bąkowska-Waldmann E., Kaczmarek T. (2019) The Use of Geo-Questionnaire in Spatial Planning: Experience From Poland. International Journal of E-Planning Research (IJEPR)8(2). DOI: 10.4018/IJEPR.2019040103

https://help.socialpinpoint.com/en/articles/5112498-geosurvey-multi-project-application

Tool 4.14. (Other) Citizen science tools

Main goal: Citizen Science is an umbrella term for activities that bring the general public into the process of scientific inquiry. It is often used to refer to data collection, organization, or analysis activities where the primary contributors are not professionally trained or actively practicing scientists. The philosophy behind Citizen Science is rooted in a few core ideas:

- access to knowledge is unequally distributed and both knowledge creation and dissemination is restricted to those with resources;
- both the production of research and dissemination of research should be made accessible to the public generally;
- publicly funded research in particular belongs to citizens;
- pragmatically, it is impossible for scientists to ask some questions or collect some kinds of data with the financial, physical, and time resources that they have without the help of crowdsourcing or shared computational infrastructure.

Format: Fieldwork, communication, visualization

Outcomes: monitoring and evaluation data obtained by non-professionals which can be further used by the professionals, public engagement

(Who?) Actors involved: researchers, local NGOs, general public

Group size: from middle to large groups

Facilitation level: medium

Level of expertise/Effort: from low to middle

Timeframe: from several minutes for clicking the buttons in the installed apps to several hours and days when collecting and analysing the citizen science data

Required materials: apps, special devises, protocols

Steps: A well described and easy-to-use approach presented by https://www.citizenscience.gov/toolkit/howto/#. It suggests 5 main steps for planning, designing and carrying out a crowdsourcing or citizen science project (adapted from Bonney et al., 2009):

1) *Scope Your Problem:*
- Know Your Tools (see https://www.ceh.ac.uk/sites/default/files/citizensciencereview.pdf)
- Engage Your Stakeholders and Participants (see the tools proposed in the section 3.2)
- Know Where Your Project Fits
- Get Approval from Your Supervisors.

2) *Design a Project:*
- Know your objectives.
- List your resources.
- Plan project management.
- Get ready to go.

3) *Build a Community:*
- Know your community partners.
- Engage your community.
- Nurture your community.
- Acknowledge the achievements of your partners.
- Be sensitive to socio-cultural issues.

4) *Manage Your Data:*

- Think of your data as an asset.
- Prepare a data management plan.
- Acquire your data.
- Process your data.
- Analyze your data.
- Share your data.
- Preserve your data.

5) *Sustain and Improve*

- Adapt to cycles of participation.
- Communicate effectively.
- Solicit feedback from your participants.
- Sustain your project funding.
- Evaluate the quality of your data.
- Evaluate your participants' engagement.
- Build flexibility into your project.
- Know how to end your project.

At each step, you'll find a list of tips you can use to keep your project on track.

Steps "General approaches to program development" and "Participant recruitment and retention" are described by Dickinson et al. (2012).

Benefits/Why to use this tool: Citizen Scientists contribute heavily to their communities and the research going on around them. There are many examples of Citizen Scientists contributing to real change for good. A particularly famous example is the Flint Water Crisis in 2016 in which a Citizen Science project uncovered a community-wide outbreak of Legionella which is a harmful bacterium stemming from the city's water source.

In combining research with public education, citizen science also addresses broader societal impacts in a profound way by engaging members of the public in authentic research experiences at various stages in the scientific process and using mod-ern communications tools to recruit and retain participants.

How it looks like/template: see Figure 4.14.1.

Figure 4.14.1. Citizen science volunteers collecting data and making sampling
Source: own photos

Remarques/Notes:

BioDiversa developed an open accessed Citizen Science Toolkit consisted of:

1. Information hubs & Network Organisations
2. Tools / Support
   2.1 Tools for setting up and managing citizen science projects
   2.2 Data platforms & repositories
   2.3 Inventories and databases of projects
3. Publications
   1.1. Guidance documents
   1.2. Scientific papers: theory and methodology
   1.3. Publications produced by CS projects
   1.4. Policy-related documents
   1.5. News & blog articles

Source/further reading:

Bonney et al. (2009). Citizen Science: A Developing Tool for Expanding Science Knowledge and Scientific Literacy. BioScience 59(11), 977-984).

Dickinson J.L., Shirk J., Bonter D., Bonney R., Crain R.L., Martin J., Phillips T., Purcell K. (2012) The current state of citizen science as a toolfor ecological research and public engagement. Front Ecol Environ 2012; 10(6): 291–297, doi:10.1890/110236

Crowdsourcing Week (2020) What is Crowdsourcing? Crowdsourcing Week. Available online: https://crowdsourcingweek.com/what-is-crowdsourcing/ (accessed on 12 December 2020).

Roy, H.E., Pocock, M.J.O., Preston, C.D., Roy, D.B. & Savage, J. (2012) Is citizen science the best approach? Understanding Citizen Science and Environmental Monitoring. Final Report on behalf of UK Environmental Observation Framework. NERC Centre for Ecology & Hydrology, Natural history museum. Available at: https://www.ceh.ac.uk/sites/default/files/citizensciencereview.pdf

Citizen Science Toolkit - COMPLETE LIST OF RESOURCES & BIBLIOGRAPHY https://www.biodiversa.org/1770

The European citizen science platform: https://www.ecsite.eu/activities-and-services/news-and-publications/european-citizen-science-platform-now-live

European citizen science association: https://ecsa.citizen-science.net/working-groups/projects-data-tools-and-technology/

SciStarter: Find a citizen science tool https://scistarter.org/tools

Citizen Science Tools for helping citizen scientists collect and analyze data https://researchguides.uoregon.edu/citizen-science-tools

Tool 4.15. Scenario comparison (before/after)

Main goal: to compare any two or three scenarios to see what is the impact of different investment/development plans so as to determine an optimal scenario. This optimal scenario can serve as the guideline of your strategic decision. For example, these scenarios are created to simulate the situations where you:

- Invest the same amount of budget and resources on different sets of contents.
- Invest different amounts of budget and resources on the same set of contents.
- Invest different amounts of budget and resources on different sets of contents.

Format: Template / visualization

Outcomes: defined optimal scenario as the guideline of your strategic decision

(Who?) Actors involved: project members, experts

Group size: 1-3 project members

Facilitation level: medium

Level of expertise/Effort: middle (need to install the web tools)

Timeframe: 1-2 h

Required materials: web-based applications (see below)

Steps: Explained by Project and Portfolio management Help centre web tool (see https://ppm.softtek.com/itg/pdf/manual/Content/UG/WIA/Step5-compare-scenarios.htm)

- To run a scenario comparison: From the menu, select Open > What-if Analysis.
- In the Scenario List page, select two or three scenarios you want to compare, and click the Compare Scenarios icon or button.
- PPM does not support comparing more than three scenarios at a time.
- The comparison results are displayed in the Scenario Comparison page.
- Compare the results.
- Chose the optimal scenario.

Benefits/Why to use this tool: to define optimal scenario as the guideline of strategic decision

How it looks like/template: see Figure 4.15.1.

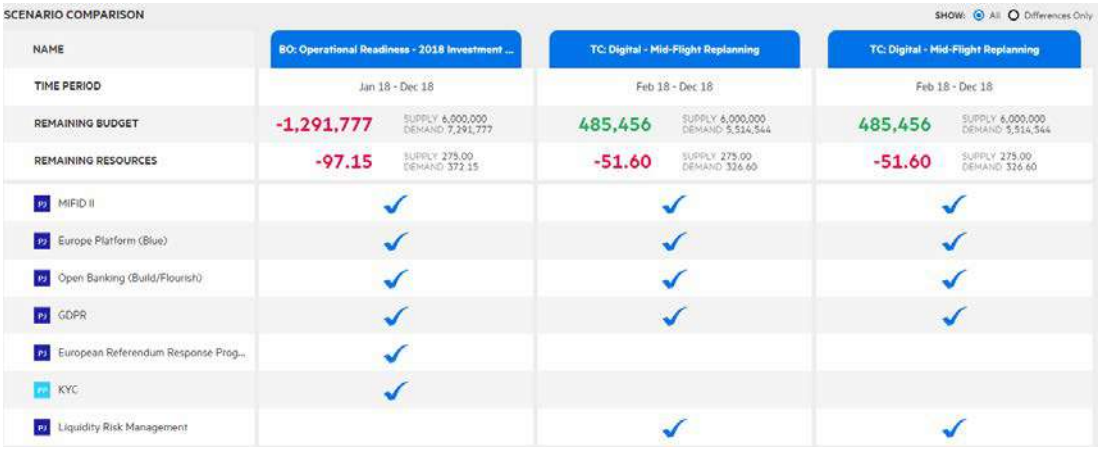


Figure 4.15.1. Example of scenario comparison web tool
Source: https://ppm.softtek.com/itg/pdf/manual/Content/UG/WIA/Step5-compare-scenarios.htm

Remarques/Notes:

The comparison is done from 4 perspectives:

- Time periods of each scenario
- Remaining budget: Whether the supply budget can cover the demanded budget of moved-in contents in each scenario. Red negative value indicates how much demanded budget exceeds supply budget. Green positive value indicates how much supply budget exceeds demanded budget.
- Remaining resources: Whether the supply resources can cover the demanded resources of moved-in contents in each scenario. Red negative value indicates how much demanded resources exceeds supply resources. Green positive value indicates how much supply resources exceeds demanded resources.
- The selected contents: what contents are moved into each scenario, planned to be invested.
- To see differences among scenarios only, select Differences Only for the Show option.

Source/further reading:

https://help.meisterplan.com/hc/en-us/articles/115004412913-Scenario-Comparison

https://ppm.softtek.com/itg/pdf/manual/Content/UG/WIA/Step5-compare-scenarios.htm

https://docs.bentley.com/LiveContent/web/Bentley%20StormCAD%20SS5-v1/en/9800.html

ANNEX 2: Evaluation process in RECONECT: Matching plans and implementation status

Short summary

Based on the analysis of the evaluation plans presented in D2.6 and the short survey conducted among the Demonstrators, the report provides the results of the analysis of evaluation process in Demonstrator sites and lessons learned. In this survey conducted in December 2022 – January 2023, the Demonstrators were asked to describe their implementation status using a systematic inventory evaluation template consisted of 15 questions (both closed and open). The main findings on the status of implementation of the evaluation plans are presented in form of a brief description of these plans for each of the nine Demonstrators. Additionally, cross-site analysis is also provided.

According to the survey, all Demonstrators have implemented their evaluation plans presented in Deliverable 2.6. Four out of nine Demonstrators had to slightly revise and/or adjust their evaluation plans, mostly due to a) the need to revise indicators based on discussions with stakeholders (Inn River), b) availability of GIS-based spatial or other data and models (Ijssel River, Inn River) or reconsideration of appropriate statistical methods (Greater Aarhus), c) the need to carry out additional data collection activities, e.g. a survey addressing the sub-goal 'Flood risk reduction' (Odense). The other five Demonstrators, i.e. Thur River, Portofino Natural Park, Var River, Les Boucholeurs and Elbe Estuary, have not revised or modified their evaluation plans.

It was revealed that in most cases, the indicators were selected to best fit the specific characteristics and main purpose of the NBS sites (Greater Aarhus, Elbe Estuary). Another approach to indicators' selection was based on discussions with stakeholders – e.g. local authorities as the main responsible actor for the implementation of the NBS measures (Thur River and Inn River) and experts being partners or subcontractors in the project itself (Inn River, Odense). The suitability of indicators for monitoring and their validity for this type of NBS was also mentioned (Var River, Les Boucholeurs, Portofino Natural Park). The availability of data was only referred to by the Demonstrator Ijssel River.

Thus, Demonstrators used the following approaches to indicators' selection: 1) indicators should be easily measurable, meaningful to stakeholders, relevant and robust (Thur River, Inn River, Elbe Estuary, Portofino Natural Park, Odense); 2) indicators should be able to provide a more holistic picture of the effects of the NBS and better describe existing NBS (Odense, Var River, Les Boucholeurs); 3) societal importance of indicators (Thur River) / added value of NBS for both citizens and nature (Greater Aarhus, Portofino Natural Park); 4) data availability (Ijssel River).

All nine Demonstrators involved stakeholders in the preparation and implementation of their evaluation plans, e.g. representatives of public authorities and policy makers as well as stakeholders from academia and research centres. In addition, some sites also involved private sector organisations (River Thur, River Ijssel, Odense and Portofino Natural Park) and civil society organisations (Odense, Greater Aarhus, River Ijssel, Portofino Natural Park) in the evaluation.

Of all the participatory methods and tools available for evaluation and monitoring of NBS, expert interviews and questionnaire surveys were the most frequently used in the past, and these tend to be used in future activities. However, focus group discussion, scenario comparison (before/after) and transect walks were also used by some sites and will continue to be used in the future. Several Demonstrators also listed some new tools that they plan to use in the future, such as logical framework analysis, participant observation, participatory and social mapping.

The most frequently cited motives for the selection and use of tools were: a) providing a comprehensive and meaningful picture of the situation; b) encouraging stakeholder involvement (experts, authorities) and ease of use so that the tools can be applied with little effort; c) suitability of the tools for data collection in the given context, especially during the pandemic; d) availability of tools.

The survey also enabled to summarize the lessons learned from Demonstrator's experience and several recommendations for Collaborators:

- *Close cooperation and appropriate communication with stakeholders:* Exchange with stakeholders in the process of indicator selection should start as early as possible, also active collaboration in the evaluation phase is crucial for drawing meaningful conclusions (Thur River, Greater Aarhus), use of visualisations and similar (e.g. simulation-based photo rendering, etc.) to improve communication of functionality of proposed interventions and limited impact on current local conditions (pre-intervention situation) (Portofino Natural Park, Var River);
- *Selection of tools appropriate to the specific data collection situation and stakeholders:* Stakeholders' acceptance and willingness to be involved in the evaluation process depends to a large extent on whether the requirements for the use and usability of a tool match the actual knowledge and capacities of the stakeholders (Greater Aarhus). Tool selection should therefore be guided by this fit rather than by theoretically possible outcomes of tool use;
- *Ensure the applicability and usability of indicators:* It is better to focus on a few important indicators (and be prepared to further reduce their number if necessary) than to overwhelm stakeholders with an overly comprehensive list of indicators. In addition, indicators should be clearly explained and relatively well established to allow for comparative analysis (Inn River).
- *Check data availability:* Conduct a proper scan of available data sources to inform the selection of indicators (Ijssel River).
- *Take a holistic approach:* Find indicators that give you the most complete/comprehensive picture of the impact of the proposed NBS in order to recognise and share information on its full potential (Odense, Les Boucholeurs, Var River).

Motivation and methodology

In RECONECT project Deliverable 2.6 (Co-monitoring and co-evaluation plans for Demonstrators A and B) Demonstrators focused on describing procedures for monitoring and evaluating the performance of their NBS projects in order to assess their progress towards specific sub-goals. In this context, monitoring and evaluation plans were presented for all Demonstrator A and B sites.

The evaluation plans describe the planned evaluation activities. They listed and explained in detail the indicators planned to be used to assess the impacts of the NBS project on the various aspects of the goals and sub-goals specified for the three so-called challenge areas WATER, NATURE and PEOPLE. Hence, plans are divided into the sections: WATER indicator-based evaluation, NATURE indicator-based evaluation, and PEOPLE indicator-based evaluation.

In addition, they specify for each indicator:

a. what a change in the indicator value to be interpreted as success ('target value'),
b. in which time period the effect is expected to occur ('time scale'),
c. which stakeholders the results of the evaluation should be presented to and

d. how often the evaluation should take place and how long it should last ('evaluation frequency and length').

Since experience shows that adjustments and additions are to be made in the course of implementing such plans, the demonstrators were asked to describe their implementation status. For a systematic inventory, UFZ developed an evaluation template and conducted a survey in the period December 2022 – January 2023, in which all nine Demonstrators took part. The survey template/form consisted of 15 questions (both closed and open) divided into three parts, as shown in Figure 2.

The main findings on the status of implementation of the evaluation plans are presented in the following sections following a brief description of these plans for each demonstration site.

The main findings on the status of implementation of the evaluation plans are presented in the sections below, following a brief description of these plans for each demonstration site.

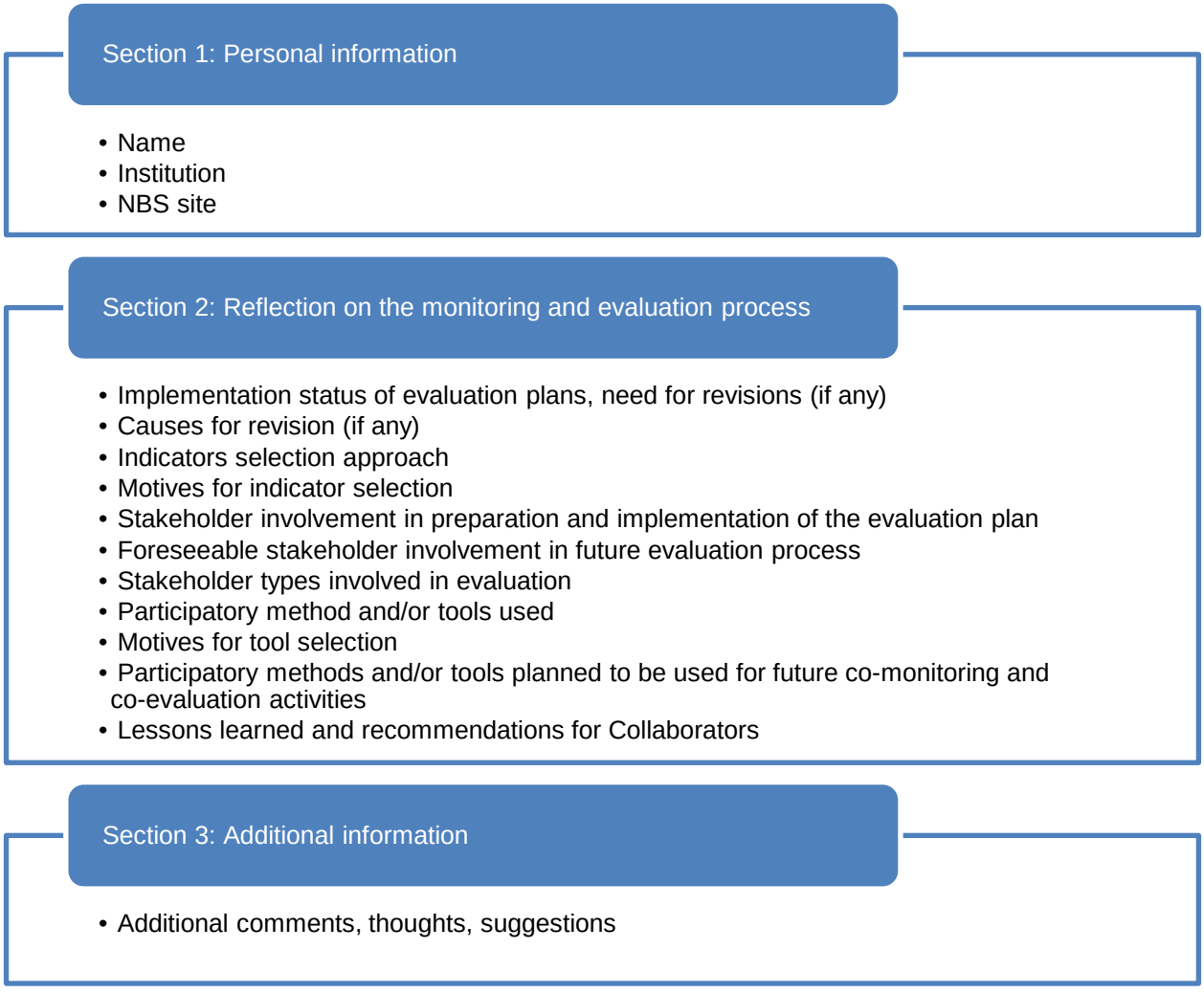


Figure A2.1: Reflection on monitoring and evaluation process of NBS at Demonstrator sites: Survey template
Source: authors

Evaluation plan of Elbe ‘Vier- und Marschlande’, Germany – DA1

i. Brief description

The WATER indicator-based evaluation was based on four closely related indicators: ‘Mitigating and storing runoff/flood peak reduction’, ‘Flood hazard’, ‘Delay time to peak’, and ‘Flood peak reduction’. Baseline monitoring was to be provided by gauging stations measuring the effectiveness of the planned hybrid NBS in the area. A worst-case scenario was to be used for the hydrological modelling of the effects of the proposed NBS. Critical water levels have already been known, and the NBS's efficiency could be proven if expected water levels were not reached in a worst-case scenario situation. The results of the evaluation were to be presented and discussed mainly with water and local authorities, but may also be presented to citizens. The evaluation should be carried out after each flood event.

The NATURE indicator-based evaluation was to be based on the indicator ‘Species richness and composition’ to address the impact ‘Increase in biodiversity of flora and fauna’. Specifically, data were to be collected on changes in native vegetation, local/national biodiversity targets, number and type of protected species, species diversity and species with restricted range. Baseline data were already available from an existing public monitoring programme due to obligations under the Natura 2000 Directive, the Flora Fauna Habitat Directive and the Water Framework Directive. Only minor changes in the abiotic and biotic environment were expected by the partners, and major changes would only be observed after the end of the RECONECT project. As the monitoring was to be embedded in public monitoring programmes required by European Directives, the tracking of long-term trends was to be ensured.

The PEOPLE indicator-based evaluation planned to use the indicator 'Vulnerability/Economic damage cost' to address the impact 'Reduced number of buildings affected by floods'. Direct economic damage costs were to be used to calculate the benefits of implementing the NBS by comparing potential damage from flood events in the baseline scenario (without the NBS) with the post-intervention situation (including the NBS). The baseline scenario should include damages caused by flooding to houses based on past events. Direct damage costs should be collected using official damage reports and registers, coupled with insurance reimbursements of affected customers/households. Potential damage costs were to be derived using numerical hydrodynamic models. No specific target indicator value was set, but it was expected that successful implementation of the NBS would lead to a reduction in flood risk to existing urban infrastructure. Additional evaluation activities were planned to address other socio-economic benefits once the NBS was implemented.

ii. Implementation status

Elbe Estuary has implemented the evaluation plan as described in the D2.6. Indicators were selected based on the main character and main purpose of the implemented NBS being enhancement of the current flood protection. So, WATER indicators that assess flood and flood hazard related parameter were chosen. With regard to NATURE indicators, those were chosen, that fit best to the potential anticipated impacts of the NBS in the area. Because the implemented NBS does not involve a significant change in habitat structure or water courses or in land use, indicators related to those goals are not applicable to the NBS area. Furthermore, the selection of the indicators was based on the specific expertise of the respective project partners. Among the stakeholders, academia & research centres as well as public authority & political representation were involved have been involved in the preparation and implementation of the evaluation plans. Scenario comparison (before/after) was selected and actively used as the most suitable tool for co-evaluation. Along with this tool, also expert interview is planned to be applied in the future participatory process.

The plan has not been revised or modified. It was as described in project deliverable D2.6.

Evaluation indicators were chosen based on the main character and purpose of the NBS to be realized, i.e. improvement of the current flood protection level. Thus, WATER indicators were selected to assess flood and flood hazard-related parameters. With regard to NATURE indicators, those were selected that best fit the expected impacts of the NBS in the area. As the NBS project does not involve significant changes in habitat structure, water courses or land use, indicators related to these aspects were not taken into account. Furthermore, selection of indicators was based on the specific expertise of the involved project partners.

Stakeholders involved in the preparation and implementation of the assessment plans included academia and research centres as well as public authorities and political representatives.

Scenario comparison, i.e. comparative ex-ante and ex-post intervention analysis, was selected and used as the most appropriate co-evaluation tool. In addition, expert interviews are planned to be used for the future participatory monitoring process.

Evaluation plan of Odense, Denmark – DA2

iii. Brief description

In the WATER indicator-based evaluation, the indicator 'Coastal flood reduction' was to be visualised by a Lidar survey. The measurements of the amount of flooding and potential changes in salinity should be compared before and after the implementation of the NBS project. It was determined that it would be considered a success if the protection of the residential area at Seden Strandby had improved, the area was flooded more frequently and a larger part of the area became more saline.

In the NATURE indicator-based assessment, three indicators were to be used. The first indicator, 'Habitat area', was to be assessed using shapefiles documenting the situation before and after the implementation of the NBS project. These were to be compared using GIS operations to track changes for different habitat types in the area. The target change for this indicator was set at whether the area for the different habitat types had increased or the vegetation cover had developed towards the desired habitat types.

The second indicator used was 'Location of habitat boundaries', which was also compared using GIS operations. The target change for this indicator was whether the extent of the different habitat types had changed or vegetation cover had developed towards the desired habitat type in areas not previously covered by target habitats.

The third indicator to be used was 'Species richness and composition', which compared vascular terrestrial plant species and bird species richness and composition before and after implementation of the NBS project. The target aspired for this indicator was whether the area began to support fewer generalists and more desirable breeding and wintering meadow/seashore bird species, and was more characteristic of Atlantic salt marsh plants than before the NBS project was implemented.

In the PEOPLE indicator-based evaluation, the only indicator used was 'Number of people visiting or staying in the NBS area', which compared the number of visitors and their purpose for visiting the NBS area, obtained from monitoring of the NBS area, with estimates of numbers and targets from years prior to NBS implementation. The target for this indicator was whether the number of visitors had increased, together with the forms of recreation taking place in the area.

The overall evaluation was to be presented to Odense Municipality and stakeholders. It was planned to be carried out every 6-10 years, following the national monitoring of natural habitats within Natura 2000 sites. The indicator-based evaluation for people specifically was to be carried out twice a year. The survey was to be conducted once during the RECONECT project.

iv. Implementation status

The evaluation plan was implemented with adjustments, but no changes were made to the indicators. Instead, an additional survey was carried out addressing the NBS' impact regarding the sub-goal 'Flood risk reduction'.

The indicators were selected in collaboration with the demonstration cluster partners in the RECONECT project, i.e. Amphi, DTU, Ramboll and Odense Municipality. The main criterion for the selection of indicators was to find indicators that are measurable and provide a holistic picture of the effects of the NBS.

The preparation and implementation of the evaluation plan was mainly done internally within the demonstrator cluster (academia & research centres), but the municipality (public authorities & political representation) as well as some private sector and civil society organisations were also involved in this process.

Focus group discussions were the most frequently used tool due to its easy-to-apply approach. In addition, it is planned to use social mapping, expert interviews, participant observation and participatory mapping in the future.

Demonstration site owners make the recommendation to Collaborators that they should ensure finding suitable indicators for the evaluation that give the most complete picture of all possible impacts of the NBS.

Evaluation plan of Portofino Natural Park, Italy – DA4

v. Brief description

The WATER indicator-based evaluation was planned to include three indicators, i.e. 'Landslide hazard', 'Floating transport in the main rivers' and 'Vulnerability'. A comparison was to be made between data collected before and after the implementation of the NBS in order to assess the effectiveness of the interventions. No specific targets were set, although a reduction in the risk of landslides, floating debris and vulnerability was expected over the course of the project. Evaluation was planned to be continued beyond the end of the RECONECT project, if adequate resources were to be found, in the aftermath of significant changes in the area or geohydrological events.

The NATURE indicator-based evaluation was also to be based on three indicators. i.e. 'Habitat area', 'Land use/land cover' and *Species richness and composition'. Indicators were selected to assess changes in habitats, agricultural land and species occurrence before and after the implementation of the NBS. If the size of habitats, agricultural land or species richness and composition improved after NBS, sub-goals were to be considered achieved. Evaluations were to be conducted twice, i.e. before and after the realization of the NBS. Repeating the assessment every 5 years was considered ideal. The results were to be presented to stakeholders such as the Portofino Park, the Municipalities of Portofino and Santa Margherita, representatives of the Liguria Region but also to citizens.

The PEOPLE indicator-based evaluation was to be based on two indicators, i.e. 'Number of people that visit or spend time in the NBS area' and 'Loss of cultural heritage due to hydro-meteorological events'. The first indicator was selected to assess the impact of the NBS on 'Improving safety conditions and practicability of trails in the NBS area' by comparing the number of visitors obtained from monitoring the NBS area with estimates from prior years. An increase in the number of visitors and improvement in safety and practicability of trails was aimed for. The second indicator was chosen to assess the impact of the NBS on 'Improving safety of tourists and of the Abbey itself' by comparing the number of visitors in conjunction with evaluating the risk reduction obtained through the NBS implementation. The evaluation was to be presented to mayors, policy-makers, open air sport associations, environmental associations, and tourist facilities personnel. A repeated evaluation even after the end of the RECONECT project was aimed at, if proper resources for conducting these assessments were to be acquired.

vi. Implementation status

The plan has not been revised or modified.

The indicators have been selected according to the most pressing risk issues in the pilot area and taking into account its specificities, both in terms of morphology and high natural value, as well as the high number of tourists that visit it. The high risk related to possible shallow landslides triggering along terraced steep slopes, the presence of the ancient Abbey in San Fruttuoso, tourism facilities, hike paths and culverts at the mouth of the streamed, and finally Natura 2000 and Park area and its high natural value are the most prominent motives for the indicator selection.

Stakeholders from almost all groups were involved: academia & research centres, public authority & political representation, private sector organizations, civil society organizations. Among them the Park Community which is the part of the public body that ensure the relationships between people that live and work in the area and the administration. In addition, the Fondo per l'Ambiente Italiano (FAI) was which is an association who manage and has the property of the ancient San Fruttuoso Abbey, other associations and the boatmen association which has been crucial in the number of visitors' assessment.

Almost all types of stakeholders were involved in the evaluation activities: Academia & research centres, public authorities & political representation, private sector organizations, civil society organisations. Among them was the Park Community, which is the part of the public body that manages relations between the people who live and work in the area and the administration. In addition, the Fondo per l'Ambiente Italiano – FAI was involved, an association that manages and owns the ancient abbey of San Fruttuoso, other associations and the boatmen's association, which has been crucial in assessing the number of visitors.

Visitor numbers were assessed using special counters placed along the trails. Expert interviews, direct communication and debates were chosen as the most effective co-evaluation tools. These tools will also be further used in the future activities.

Local RECONECT partners recommend to use simulations or photo renderings for the visualisation of the post-intervention scenario. As this supports the communication of the functionality of proposed interventions with simultaneous emphasis on the little impact on the visual status quo.

vii. Brief description

For the WATER indicator-based evaluation the indicator ‘Flood hazard’ was to be considered. The micro-scale flood hazard assessment in the Herxen study area was to be carried out using a 1D/2D hydrodynamic model. The parameters for the model included vegetation data collected before and after the implementation of the NBS. The addressed sub-goal ‘Flood risk reduction’ was to be achieved if the flood risk was reduced after the implementation of the NBS. The results of the evaluation were planned to be shared with the RECONECT partners and Rijkswaterstaat. The evaluation was to be carried out using available data from relevant sources until 2021.

For the NATURE indicator-based evaluation the indicators ‘Land cover area’ and ‘Number and type of protected animal species’ were selected. Land use and land cover changes were to be evaluated by assessing changes in area and pattern before and after the implementation of the NBS. There was no target specified for the amount of land cover change over time, but the sub-target of shifts in land use and land cover was to be met if changes in area and pattern occurred. The indicator ‘Number and type of protected species’ was also to be evaluated by comparing the baseline before the establishment of the NBS. The evaluation was to cover the period from 2006 to 2020.

For the PEOPLE indicator-based evaluation, the indicator ‘Maintenance and management cost of NBS’ was to be used by comparing these two types of costs of the NBS with the costs of maintaining the IJssel in the form of dredging. In addition, the changes in land values before and after the implementation of the NBS were analysed. No target value was defined for the reduced maintenance and management costs or the changes in land values. The evaluation was planned to cover a period of approximately 15 years, from 2006 to 2018.

All evaluations were to be carried out once during the RECONECT project. There was no plan for repeating the evaluation after the RECONECT project and all results were to be presented to Rijkswaterstaat.

viii. Implementation status

The evaluation plan was revised by selecting the indicators for final use based on the availability of models and – related thereto – data availability.

As the main participatory activity, a questionnaire survey was carried out with the support of Rijkswaterstaat and other organisations which supported the distribution of the questionnaires.

Under the given framework conditions (not only but especially the pandemic) conducting a questionnaire survey was selected as the most appropriate and suitable co-evaluation tool.

Besides Rijkswaterstaat, the authority responsible for, among other things, the construction and maintenance of waterways in the Netherlands, private sector organisations and civil society organisations were involved in the evaluation process.

Partner recommend to rigorously check data availability at a very early stage in order to inform the selection of evaluation indicators.

ix. Brief description

The WATER indicator-based evaluation aimed to address different aspects of the sub-goal 'Flood risk reduction' using the indicators 'Surface runoff reduction,' 'Slowing and storing runoff,' and 'Flood hazard.' To better understand the influence of vegetation and soil conditions on runoff behaviour, the surface runoff was to be tested under different conditions at the plot. The reference situation for the evaluation was planned to be the 1950s, before the realization of the NBS when the afforestation started. Land cover changes were to be tracked using historical aerial imagery and simulated using a hydrological model. A measurement program was to be set up for artificial rainfall tests in the Geroldsbach-Götzens catchment. Historic data sets and the evolution of forested and vegetated areas were evaluated. Beyond realizing historic and current situations exclusively, land use scenarios for assessing the change over time and potential future land-use scenarios and climate scenarios were modelled.

The use of the indicator 'Landslide hazard' was to be based on the qualitative and literature-based assessment by experts on the impact of reforestation on reducing landslide risk. The evaluation was to compare different periods after the implementation of the NBS depending on the earliest availability of data.

The NATURE indicator-based evaluation was to be based on the following four indicators. The first indicator, 'Habitat area,' was linked to the sub-goal of 'Shifts in land use and land cover' and quantified by aerial images and a literature study to identify changes in habitat locations and boundaries before and after afforestation. As the specific NBS type, afforestation and grassland typically react slowly, and field investigations or monitoring were not considered applicable. Hence, land cover assessments were used for evaluation.

The second indicator, 'Location of habitat boundaries,' was to rely on historical maps, aerial pictures, and satellite imagery to estimate attributes such as soil thickness, forest age, and distribution. As with the previous indicator, land cover assessments were used to identify boundaries and changes in habitat locations.

The third indicator, 'Land cover,' was to assess changes in land cover types over time in the NBS area using aerial photographs and satellite data. GIS software and programming languages were to be used to carry out spatial analyses to estimate the composition of different land cover types.

The fourth indicator, 'Species richness and composition,' was to evaluate the impact of NBS on the increase in biodiversity of flora and fauna based on earlier studies focusing on nature in the catchment Geroldsbach-Götzens. Since the assessment was literature-based it was expected to be unlikely to see any remarkable changes in species richness in most recent years. However, it was foreseen that the analysis could shed some light on the NBS effect on maintaining and enhancing biodiversity in the area overall.

The PEOPLE indicator-based evaluation was originally planned to be based on the indicators 'Recreational quality of the area' for the sub-goal 'Increase recreational opportunities' and 'Damage costs and building prices' for the sub-goal 'Stimulate/increase economic benefits'. As for the latter indicator information on flooded or protected areas seemed – at best – to be scarce the indicator 'Land and/or property value' was considered as an alternative instrument.

The first indicator 'Recreational quality of the area' was to address changes in the attractiveness of the NBS area over time. The analysis was to be based on expert reviews and existing publicly

available statistical data (e.g. overnight stays, hotel bookings, tourist/sports-related data in general). A comparison was planned to be made for different periods after NBS implementation. Although no remarkable change in the recreational value of the NBS area was expected, still a stable and good level of recreational activities over the last decades after realization of the NBS and linked to its existence was foreseen.

The second indicator ‘Land and/or property value’ was to evaluate changes in property value and building prices in flood risk areas close to the NBS. The evaluation was to be based on a qualitative analysis of statistical parcel and building prices. A comparison was planned to be made for different periods after NBS realization.

The sub-goals of ‘Increase recreational opportunities’ and ‘Stimulate/increase economic benefits’ were to be considered achieved if the indicators used would show positive results.

Different aspects of the evaluation were to be presented to the Municipality of Götzens and Wildbach-und Lawinenverbauung (WLV).

The evaluation was planned to be carried out once within the lifetime of the RECONECT project for different periods after the realization of the NBS.

x. Implementation status

The evaluation plan was revised on some points, in particular following discussions with stakeholders. The main focus of the stakeholders was on the WATER indicators.

With regard to the NATURE indicators, it has been clarified that the parameters addressed are those related to available GIS or other spatial data, focusing on parameters relevant for modelling runoff behaviour. This excludes the assessment of species structure in the field or from previous reports. Where sources were found to be poorly available, own species-related field surveys reflected the current state and therefore could not adequately account for changes. This applies in particular to the NATURE indicator ‘Increase in biodiversity of flora and fauna - species richness and composition’, which is no longer addressed in the project.

With regard to PEOPLE indicators, the data collection approach chosen for the indicator ‘Recreational quality of the area (including number of people that visit or spend time in the NBS area)’ was to conduct a survey at the core site and in the surrounding area. The survey was carried out and data analysed in cooperation with DTU. The title of this indicator was revised.
The originally selected indicator ‘Damage costs and building prices’ was discussed intensively, especially with the stakeholder WLV. It was found that the indicator as such is not applicable in its current form. ‘Damage costs’ (e.g. flood affected parts/ alterations) and ‘Changes in building prices’ had to be analysed separately. However, difficulties were encountered with each of these newly created indicators. For ‘damage costs’, the existing data in the WLV did not allow a distinction to be made between the effects of the NBS and other technical retention measures. For 'Changes in building prices', causes other than the implementation of the NBS, such as general population growth or increases in the cost of living, were considered to be the main drivers.

In general, indicators were selected on the basis of recurring discussions with stakeholders, local authorities and experts who were partners or subcontractors in the project itself.

Relevance and significance of the indicators for the case study are mentioned as the main motives for the selection of indicators.

Stakeholders involved in the preparation and implementation included academia and research centres as well as public authorities and political representatives.

For this purpose, many of the co-evaluation tools were used, such as expert interview, questionnaire survey and transect walk. The transect walk revealed that certain routes were not feasible due to steep slopes. Therefore, it was partly adapted to existing paths and roads.

The co-evaluation tools used felt natural and were mostly chosen intuitively.

For future co-monitoring and co-evaluation activities, focus group discussions and scenario comparisons (before/after) will be used in addition to the tools already mentioned.

It is recommended to reduce the number of indicators and to focus on a few important ones, which will be crucial for the later discussion and will facilitate the comparison (lessons learned from the discussion with stakeholders and especially public authorities).

Evaluation plan of Greater Aarhus, Denmark – DB3

xi. Brief description

The WATER indicator-based evaluation planned to use two indicators. The first indicator, 'Flood peak,' assessed the NBS's impact on 'Flood peak reduction.' It was based on the assumption that a reduced flood peak would also reduce the risk of flooding downstream. The second indicator, 'Delay time to peak,' assessed the impact of the NBS on 'Prolonging the time to flood peak downstream.' It is related to the assumption that a delayed time to peak would increase the time available to prepare for any emergency response.

For both indicators, statistical analysis and the use of a dynamic river model were to be used to find relationships between rainfall, discharge, retention volume, and reduction of flood peaks. The reference scenarios were to be based partly on pre-NBS data and partly on data from an upstream control area. The results were to be presented to the water authorities, and the evaluation was to be carried out immediately before and after the RECONECT project.

The third indicator, 'Pollution in coastal waters,' addressed the expected impact 'Reduce the nitrogen load to coastal waters.' Data were already available and relevant results were to be summarised for use in the evaluation.

The fourth indicator, 'Temperature and dissolved oxygen concentration,' addressed the NBS's impact on 'Raised water temperature and reduced dissolved oxygen concentration.' Temperature and dissolved oxygen concentration in the River Egå were compared between upstream and downstream hydrometric stations. The reference scenario was established using data from a monitoring station at the entrance to Egå Engsø and a monitoring station in a relevant area in Lystrup. The results were also compared with standard values for good ecological status. Changes in water temperature and dissolved oxygen concentration were expected to be quickly measurable. The results of the evaluation were to be presented to the water authorities and the evaluation was to be completed by the end of the RECONECT project.

The NATURE indicator-based evaluation planned to use four indicators to assess the impact of the NBS. The first indicator, ‘Habitat area’, aimed to assess changes in habitat size by comparing shapefiles before and after NBS implementation using GIS operations. The reference scenario was to be obtained by delineating aquatic and riparian habitat units based on aerial photographs

before implementation. The target indicator value was an increase in the area of different habitat types, without specifying a minimum amount of change required. The evaluation was to be carried out every 3-5 years and once during the RECONECT project. The results were to be presented to the Municipality of Aarhus and the residents of Aarhus and Lystrup.

The second indicator, ‘Location of habitat boundaries’, was planned to assess the impact of the NBS on changes in the structure and function of habitats by comparing the status quo with the baseline situation before the implementation of the NBS using GIS operations and expert knowledge. The reference scenario was established in the same way as for the ‘Habitat area’ indicator. Changes in the structure and function of the different habitats as well as the degree of habitat fragmentation caused by the NBS were to become visible. The evaluation also was expected to show how different habitat patches have expanded or contracted over time, whether the habitat patches created have gained or retained the 'core area' function over time, and whether the habitat provision of the NBS has changed over time.

The third indicator, ‘Land cover area’, was chosen to assess the impact of the NBS on ‘Changes in land use and land cover’ by comparing the status quo with the baseline situation prior to NBS implementation using GIS operations and expert knowledge. The evaluation results were to show whether the implementation of the NBS has led to changes in land cover and how the land cover has changed over time.

The fourth indicator, ‘Species richness and composition”, was designed to assess the impact of the NBS on the ‘Increase in biodiversity of flora and fauna’ by comparing the status quo with the situation before the implementation of the NBS and with reference sites. The evaluation looked at indigenous vegetation, local/national biodiversity targets, number and type of protected species (species richness), species diversity and restricted-range species (unplanned impact). The reference sites were similar shallow artificial lakes created in Denmark for Egå Engsø and other climate adaptation sub-projects in Lystrup for Lystrup Hovmarkspark. The evaluation results were to be presented to the City of Aarhus and the residents of Aarhus and Lystrup.

The evaluations based on these four indicators were planned to be carried out once during the RECONECT project.

The PEOPLE indicator-based evaluation was planned to use the indicator ‘Number of people that visit or spend time in the NBS area’, which addresses the impact ‘Changes in the attractiveness of the NBS area’. The number of visitors and their reasons for visiting the area were to be obtained through continuous monitoring and to be compared with estimates from before the implementation of the NBS. To calculate the number of visitors, six people counters have been installed at the access points to the path around Lake Egå since 2020. The baseline for this indicator was assumed to be zero visitors, as there were no recreational activities at the site prior to the implementation of the NBS. It was expected that there would be a direct link between an increase in the number of visitors to the NBS area and an increase in the general well-being of the population, with positive physical and psychological effects.

The target indicator value for this indicator was not set as a predetermined amount of change, but rather as an increase in the number of visitors and forms of recreation in the area. This would indicate that the sub-goal of "Increase in recreational opportunities" has been achieved. The changes in recreational opportunities could be expected to be identified quickly, as it is anticipated that there will be a shift of regular activities such as jogging and cycling to the new NBS area, rather than a large emergence of new recreational activities.

The evaluation was planned to be presented to the Aarhus Municipality and the residents of Aarhus. Data collection for this indicator was planned to be carried out twice a year, with a survey carried out once during the RECONECT project.

xii. Implementation status

The evaluation plan has been partly revised.

The main reason for the revision was that the final selection of statistical methods to be used especially in the WATER indicator-based evaluation had not been completed at the time the evaluation plan was prepared. In addition, it became apparent during the process that it would be desirable to develop water management strategies for the entire catchment of river Egå which required the planning and implementation of new activities.

In general, the indicators have been selected according to their relevance to the specific characteristics of the NBS site. In particular, NATURE indicators had to assess the NBS' impact on biodiversity and, ideally, demonstrate progress in this respect. Moreover, PEOPLE indicators should be able to depict the value created by the NBS for the citizens of Aarhus.

Stakeholder engagement involved representatives from public authorities, e.g. nature expert of Aarhus Municipality, political representatives, and civil society organisations.

Of the various co-design tools, questionnaire surveys to collect information from civil society and dialogue meetings to involve the municipality's in-house nature experts were used most frequently.

Partners stress the importance of selecting participatory tools that fit not only the actual situation but also to the specific stakeholders to be engaged. To determine this, it is more important to have a good sense of the stakeholders and the extent of their 'willingness' to engage and their level of acceptance, rather than just looking at the theoretical benefits of the tools - without considering the survey context.

Evaluation plan of Thur River Basin, Switzerland – DB4

xiii. Brief description

The WATER indicator-based evaluation was to include four indicators to assess the impact of the NBS on the water system.

The indicator "Flood hazard" was chosen to measure the NBS's impact on "Flood hazard reduction." The reference value above which flooding might occur downstream from the NBS was known due to the implementation of a semi-distributed hydrodynamic model before the NBS was realized.

The indicator "Groundwater level" was selected to measure the impact of "Groundwater reaching surface." Groundwater level measurements were to be transmitted to a database every 15 minutes for constant evaluation. The groundwater level threshold was to be established, and the measurements taken before the implementation of the NBS were to be used as a baseline to define the reference value to which the measurements after the NBS would be compared. The target indicator value set was to ensure that the groundwater level stayed below the reference value indicating when drinking water wells would be affected.

The indicator "Water pollution caused by wastewater" was to be used to measure the impact of the NBS on "Drinking water production." The presence of micropollutants in drinking water was to be assessed daily, and the impact of the NBS was to be measured by comparing the presence of micropollutants and other pharmaceutical products before and after the implementation of the NBS. The target indicator value was to ensure that the concentration of micropollutants stayed below the reference values set by Swiss federal laws.

The indicator "Pollution in groundwater" was chosen to assess the impact of the NBS on "Pollution of groundwater used for drinking water production." An extensive long-term data series of the groundwater quality level was to be used to establish a reference value for groundwater quality before the implementation of the NBS. The impact of the river restoration project on groundwater quality was to be evaluated by comparing contaminant concentrations and surrogate measurements values with the reference values from before the implementation of the NBS and the overall reference values defined by the governmental agencies.

The NATURE indicator-based evaluation was to be based on one indicator, "Habitat area," to assess the impact of the NBS on "Increased area and connectivity of habitats." The main objective of the river restoration was to reconnect the forest to the river, increasing the riverine habitats for diverse flora and fauna species. Habitat areas were measured before the NBS was implemented to define a reference value and evaluate the impact of the NBS. Areal imagery survey of habitat area was to be used to measure the extension of habitats, and spatial analysis of area and field surveys were to be collected by using drone flights. Data collection took place once before and four times after the NBS was implemented.

The PEOPLE indicator-based evaluation was planned to include three indicators for evaluating the NBS's impact on the "Increased quality of life for humans". The indicators "Number of people that visit or spend time in the NBS area" and "Purpose of the number of visits to the NBS area" were to be assessed using a field survey and questionnaire for gathering information from residents in nearby communities. There were no reference values for the situation before the implementation of the NBS, but the questionnaire contained a section asking people to reflect on the time before the restoration, which was used as a reference. Evaluation was to be carried out once in the lifetime of the project.

The third indicator to be used under PEOPLE indicator-based evaluation was "Land and/or property values," which addressed the impact of "Increase or loss of land and/or property values." Data collection was to be based on survey questionnaires and discussions with land and/or property owners in nearby communities to the NBS. This evaluation was to assess changes in land and/or property values and people's willingness to pay for the NBS. Again, there were no reference values for the situation before the implementation of the NBS. The evaluation was to be carried out once during the lifetime of the project.

xiv. Implementation status

Thur River has implemented the evaluation plan as described in RECONECT project deliverable 2.6.

The indicators were selected with the active involvement of stakeholders, in particular the Canton of Thurgau Environmental Agency, which is the main actor responsible for the implementation of the NBS measures.

The purpose of the stakeholder involvement was to ensure that the indicators were meaningful and robust, as well as socially relevant. In addition, the Agency also supported the data collection

for the evaluation. In addition to representatives of public authorities and political representation, representatives of academia and research centres as well as private sector organisations were involved in the preparation and implementation of the evaluation process.

A wide range of co-creation tools were used for the evaluation, including focus group discussions, expert interviews, questionnaire surveys, participant observation, transect walks, scenario planning and scenario comparison.

The tools were chosen because they promised to provide a comprehensive and meaningful picture for the evaluation. Positive experiences of working with these tools confirmed their selection and ensured that they will be used for future (evaluation) activities.

The partners recommend to start the exchange with stakeholders on the selection of indicators as early as possible, as this is considered as the most important step in the evaluation process, together with the close cooperation with stakeholders.

Evaluation plan of Var River Basin, France – DB5

xv. Brief description

The WATER indicator-based evaluation was to be based on the indicator ‘Flood hazard’, which addressed the sub-goal ‘Flood risk reduction’. The evaluation was to be carried out by comparing the reference flood map and new flood maps based on the post-intervention situation. The aspired target was a reduction in flood risk as a result of renewed embankments and new retention ponds within the NBS area. The assessment was considered important for decision-makers in the Nice Côte d'Azur metropolitan area, as it provided a direct measure of the reduction in flood risk within the NBS. Hence, they were the main target group of the evaluation. The evaluation was planned to be carried out over a 5-year period, but if a significant flood wave were to occur, maps would be produced and compared at that time.

The NATURE indicator-based evaluation was to focus on the indicators ‘Habitat area’ and ‘Changes in aquatic habitat, flora and fauna’ by comparing the change in habitat area and documented flora and fauna species between the reference year and the year of the evaluation. The NATURA2000 reports and satellite images were to be used to monitor and provide an overview of the impact of the NBS on the habitat area. The target was to maintain the same size of the habitat and to avoid any reduction in aquatic habitat, flora and fauna. Changes in habitat boundaries and flora and fauna species were expected to take many years to occur.

The PEOPLE indicator-based evaluation was planned to be based on two indicators ‘Number of people spending time in the NBS’ and ‘Building prices in the NBS area’. The impact of the NBS on recreational opportunities was to be assessed by comparing the number of recreational spots in the NBS area before and after urbanisation of the area. The contribution of the NBS to economic attractiveness was to be assessed by comparing building prices in the NBS area over time. The sub-target of increased economic attractiveness would be achieved after validating the increased attractiveness of the NBS area. Effects were expected to be visible in changes in building prices due to changes in flood risk areas in the NBS area over the past decade.

xvi. Implementation status

The evaluation plan has not been reviewed or modified.

The indicators chosen were selected on the basis of their suitability for monitoring the development of the NBS. Data availability was not experienced to be a challenge.

In addition to academia and research centres, public authorities and political representatives e.g. of the municipality of Nice were involved in the evaluation process.

Among the tools used for the evaluation, expert interview was identified as the most convenient tool from the perspective of the stakeholders. In the future, in addition to expert interviews logical framework analysis as well as questionnaire surveys are planned to be used.

Partners recommend to pay attention to selecting appropriate communication approaches when interacting with stakeholders and to focus on use of tools that help showing the full potential of NBS.

Evaluation plan of Les Boucholeurs, France – DB6

xvii. Brief description

The WATER indicator-based evaluation was to be based on the indicator 'Flood hazard'. It focused on the reduction of coastal flood hazard and measured its achievement by comparing reference flood maps with new flood maps produced after the construction of the protection wall. The results of the evaluation were to be presented to local stakeholders, in particular to the community of Châtelaillon-Plage.

The NATURE indicator-based evaluation should have been based on the indicators 'Habitat area' and 'Changes in aquatic habitat, flora and fauna'. Hence, it was planned to focus on changes in habitat size by comparing data from NATURA 2000 reports and satellite images. Changes in aquatic habitats, flora and fauna were to be measures by comparing the number of species in the reference year and the year of the evaluation. However, these changes were not expected to become visible still during the project period.

The PEOPLE indicator-based evaluation was planned to assess the impact of the NBS on recreational opportunities and economic attractiveness. This was to be done by comparing the number of recreational spots (indicator 'Number of people spending time in NBS') and values of the indicator 'Building prices in the NBS area' before and after the reconstruction of the protection wall. The data for these assessments were to be collected from various sources, such as the official French statistics website and tourism organisations. The achievement of each sub-goal was to be reflected in the changes observed in the respective indicators. For example, an increase in the number of people spending time in the NBS area or an increase in the price of buildings in the NBS area would indicate fulfilment of the respective sub-goal.

xviii. Implementation status

The evaluation plan has not been revised or modified.

Evaluation indicators were selected that were particularly suitable for this specific type of NBS, i.e. situated in a small community, addressing the risk of coastal flooding and potentially offering many ecosystem services.

The main motive for selecting these indicators was to improve the visibility of the manifold benefits of this NBS which already exists for quite some time.

Despite the generally low level of stakeholder engagement in the evaluation process, nonetheless, representatives of academia and research centres, but also public authorities and political representatives were involved.

So far, expert interviews were conducted due to ease-of-use of the tool. In the future, logical framework analysis and questionnaire surveys are also planned to be used.

Partners stress the importance to depict how and to what extent the NBS provides benefits to the local community.

Cross-site analysis

Implementation of evaluation plans and revisions

All Demonstrators have implemented their evaluation plans presented in Deliverable 2.6. Four out of nine Demonstrators had to slightly revise and/or adjust their evaluation plans due to the following reasons:

- Revisions of indicators to be used required based on discussions with stakeholders, (Inn River)
- Availability of GIS-based spatial or other data and models (Ijssel River, Inn River) or reconsideration of appropriate statistical methods (Greater Aarhus)
- Need to carry out additional data collection activities, e.g. a survey addressing the sub-goal 'Flood risk reduction' (Odense)

The other five Demonstrators, i.e. Thur River, Portofino Natural Park, Var River, Les Boucholeurs and Elbe Estuary, have not revised or modified their evaluation plans.

Indicator selection motives

In most cases, the indicators were selected to best fit the specific characteristics and main purpose of the NBS sites (Greater Aarhus, Elbe Estuary). Another approach was to select indicators based on discussions with stakeholders - e.g. local authorities as the main responsible actor for the implementation of the NBS measures (Thur River and Inn River) and experts being partners or subcontractors in the project itself (Inn River, Odense). The suitability of indicators for monitoring and their validity for this type of NBS was also mentioned (Var River, Les Boucholeurs, Portofino Natural Park). The availability of data was only referred to by the Demonstrator Ijssel River.

As the main motives for the selection of the indicators, the following were considered:

- Indicators should be relevant, meaningful, measurable and robust (Thur River, Inn River, Elbe Estuary, Portofino Natural Park, Odense);
- Societal importance and relevance of indicators (Thur River) / added value of NBS for both citizens and nature (Greater Aarhus, Portofino Natural Park);
- Indicators should be able to provide a more holistic picture of the effects of the NBS and better describe existing NBS (Odense, Var River, Les Boucholeurs);
- Data availability (Ijssel River).

Stakeholder involvement in the evaluation

All nine demonstration sites involved stakeholders in the preparation and implementation of their evaluation plans (see Figure 3). Representatives of public authorities and policy makers as well as stakeholders from academia and research centres were involved in almost all Demonstrator sites. In addition, some sites also involved private sector organisations (River Thur, River Ijssel, Odense and Portofino Natural Park) and civil society organisations (Odense, Greater Aarhus, River Ijssel, Portofino Natural Park) in the evaluation.

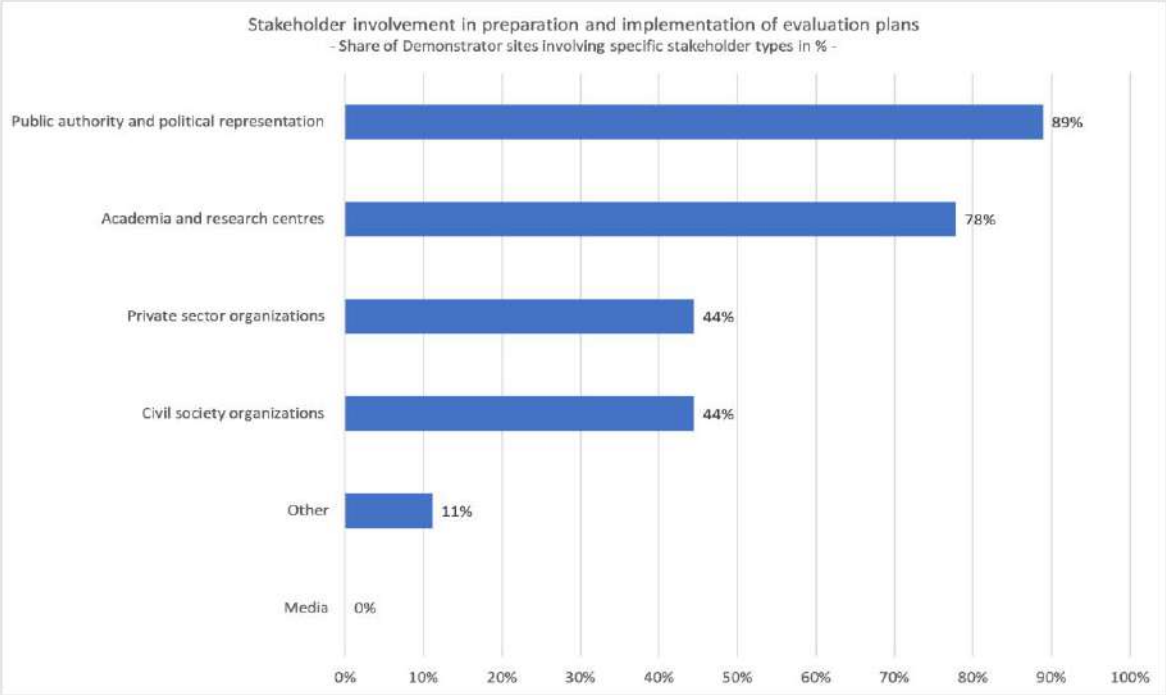


Figure 3 Stakeholder involvement in preparation and implementation of evaluation plans
Source: authors (Note: Bars indicate the share of Demonstrator sites involving the respective stakeholder type in the preparation and/or implementation of their evaluation plans)

Participatory methods and tools used in the evaluation process

Of all the tools and methods available for co-evaluation and co-monitoring, expert interviews (44.4%) and questionnaire surveys (44.4%) were the most frequently used in the past, and these tend to be used in future activities (66.7% and 33.3% respectively) (Figure 4). However, focus group discussion (22.2%), before/after scenario comparison (22.2%) and transect walks (22.2%) were also used by at least 1/5 of the sites and will continue to be used in the future. Several Demonstrators also listed some new tools that they plan to use in the future, such as logical framework analysis, participant observation, participatory and social mapping.

The most frequently cited motives for the selection and use of tools were:

- Providing a comprehensive and meaningful picture of the situation;
- Encouraging stakeholder involvement (experts, authorities) and ease of use so that the tools can be applied with little effort;
- Suitability of the tools for data collection in the given context, especially during the pandemic;
- Availability of tools.

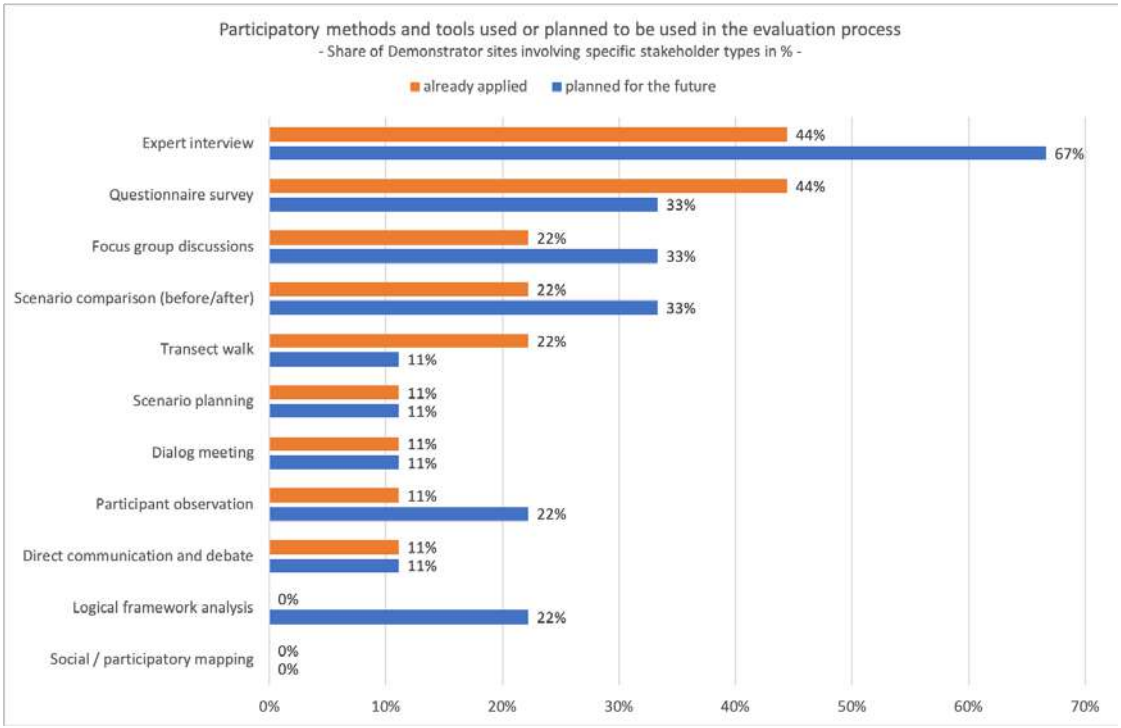


Figure 4. Participatory tools used or planned to be in the evaluation process*
Source: authors (**Note: Bars indicate the share of Demonstrator already having used or planning to use the respective participatory method or tool)*

Lessons learned from Demonstrator's experience and recommendations for Collaborators

- *Close cooperation and appropriate communication with stakeholders:* Exchange with stakeholders in the process of indicator selection should start as early as possible, also active collaboration in the evaluation phase is crucial for drawing meaningful conclusions (Thur River, Greater Aarhus), use of visualisations and similar (e.g. simulation-based photo rendering, etc.) to improve communication of functionality of proposed interventions and limited impact on current local conditions (pre-intervention situation) (Portofino Natural Park, Var River);
- *Selection of tools appropriate to the specific data collection situation and stakeholders:* Stakeholders' acceptance and willingness to be involved in the evaluation process depends to a large extent on whether the requirements for the use and usability of a tool match the actual knowledge and capacities of the stakeholders (Greater Aarhus). Tool selection should therefore be guided by this fit rather than by theoretically possible outcomes of tool use;
- *Ensure the applicability and usability of indicators:* It is better to focus on a few important indicators (and be prepared to further reduce their number if necessary) than to overwhelm stakeholders with an overly comprehensive list of indicators. In addition, indicators should be clearly explained and relatively well established to allow for comparative analysis (Inn River).
- *Check data availability:* Conduct a proper scan of available data sources to inform the selection of indicators (Ijssel River).

Take a holistic approach: Find indicators that give you the most complete/comprehensive picture of the impact of the proposed NBS in order to recognise and share information on its full potential (Odense, Les Boucholeurs, Var River).