Recommendations for refinement of the water-smartness framework and its transformation into a dashboard-type software

Deliverable 1.3

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D1.3: Recommendations for refinement of the water-smartness framework and its transformation into a dashboard-type software

Summary

One of the key objectives of B-WaterSmart is to deliver a water-smartness assessment framework (BWS AF) fully tested in the six living labs (LLs) of the project. This deliverable aims at providing first recommendations to support both the refinement of the BWS AF and the development of the corresponding dashboard. This deliverable describes (i) the approach followed to obtain the recommendations within the innovation alliance (InAll), the InAll process (Task 1.4), and an overview of the testing process of BWS AF version V_0 (delivered by WP6). It further presents (ii) the feedback on the framework from the LL problem-owners (LL_i) (with support from WP6 for feedback collection and processing of raw results), the respective analysis, and subsequent recommendations both for refinement of the framework, and the development of the dashboard-type software to facilitate its use.

Deliverable number	Work package
D1.3	WP1
Lead beneficiary	**Deliverable author(s)**
LNEC - National Laboratory for Civil Engineering	Maria Adriana Cardoso, Catarina Silva, Maria João Rosa, Helena Alegre (LNEC) Rita Ugarelli, Camillo Bosco, Gema Raspati (SINTEF) **LL feedback** Alicante LL problem-owners Ignacio Casals, Esther González (AMA), and mentors Mario Ruiz Mateo, Laura Flores (CET) Bodø LL problem-owners Silje Ulriksen Lyngstad, Marit Elveos (Bodø), and mentor Tone Merete Muthanna (NTNU) Flanders LL problem-owners Han Vervaeren, Stefanie Moerenhout, Louise Vanysacker (DeW), and mentors Geertje Pronk, Raul Glotzbach (KWR)

East Frisia LL problem-owners Julia Oberdörffer, Kolja Hesse, Stefan Wallschlag (OOWV), and mentors Kristina Wencki, Alexandra Schmuck (IWW)

Lisbon LL problem-owners Pedro Teixeira, Marina Perdigão, Fátima Neo (CML), and mentors Maria João Rosa, Catarina Silva (LNEC)

Venice LL problem-owners Nicoletta Chiucchini, Patrizia Ragazzo, Giulia Moretto (VERI), and mentors Rita Ugarelli, Camillo Bosco (SINTEF)

Quality assurance	
LNEC IWW	Margarida Rebelo Alexandra Schmuck
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List of Acronyms and Abbreviations

AC : Assessment Criterion

AF : Assessment Framework

BWS : B-WaterSmart

BWS AF : Water-Smartness Assessment Framework

EI : Expected impact

FAST : Framework ASsessment Tool

InAll : Innovation Alliance

LL : Living Lab

LL_i : Living Lab problem-owner

M# : Month # in B-WaterSmart project

Q : Question

SO : Strategic Objective

SWOT : Strengths, Weaknesses, Opportunities and Threats

T : Task

WP : Work Package

Executive summary

In the scope of *WP1 – Co-create & demonstrate systemic innovation in 6 LL* of the B-WaterSmart (BWS) project, the Innovation Alliance (InAll) was set up across six LLs: Alicante, Bodø, Flanders, Lisbon, East Frisia and Venice. The InAll is a key co-production instrument of BWS and is tailored for the seven BWS LL primary problem-owners (LL_i) from the six LLs to internalise and learn by doing how to use the objective-oriented water-smartness assessment framework (BWS AF) as a key instrument for strategic planning. The seven LL_i represent diverse missions, characteristics, locations, contexts, dimensions, and challenges.

InAll provides, on the one hand, a chance for the LL_i to learn by doing and share their experiences on using the BWS AF and, on the other hand, an opportunity for the BWS AF developers (WP6) to receive the LL_i feedbacks on the framework. The InAll process follows a 5-phased schedule program to facilitate a common guidance to strategic planning, as well as the application of the BWS AF.

At an early stage of the planning process, the following information was collected: (i) specific feedback on each objective, criteria, and metrics aiming to assess particular aspects of BWS AF, and (ii) generic feedback about the framework, aiming to assess whether the framework fits the purpose of strategic planning, and to receive suggestions regarding its use through a dashboard-type software. The feedback was collected at InAll. WP6 supported feedback collection and raw data processing.

Based on the analysis of the LL_i feedback, first recommendations were produced for supporting both the refinement of BWS AF and the subsequent development of the water-smartness dashboard. The overall recommendations are:

i. to carry out a critical review and the necessary changes to the current BWS AF V_0 to ensure:
    - the BWS AF purpose is clearly described, as well as how to use it and how to interpret the results for strategic planning;
    - regarding the purpose, that the BWS AF is well structured, complete and parsimonious (considering the necessary and sufficient components) while flexible, applicable to diverse contexts, and that the description of each component is clear;
    - the alignment between strategic objectives, assessment criteria and metrics is assured;
    - each strategic objective is adequately described by the assessment criteria considered;
    - each assessment criterion is duly assessed through the metrics assigned;
    - each metric has adequate reference values whose context-dependence is, whenever applicable, clearly stated;

- each metric has assigned its planning level of applicability, and whether it is applicable as an assessment metric or as context information, and the scale of application (e.g., local, regional);

ii. additional feedback may be useful in a phase of greater consolidation of the planning process, i.e., after a complete BWS AF application (to carry out a self-assessment, diagnosis, solutions' identification & assessment, and decision-making), which may provide a more validated opinion on BWS AF fit-for-purpose use. Regarding this last recommendation, InAll is the privileged means to get this information in a staged process.

Regarding the transformation of the water-smartness framework into a dashboard-type software, the feedback allowed for identifying recommendations regarding the data input, new metrics definition, metrics aggregation, normalization, judgment, and visualization (temporal basis, scenarios, and alternative solutions).

Therefore, the results herein presented, which were obtained in close collaboration of T1.4 with WP6 and with contributions from T3.9, will help to support the development of the final version of the BWS AF in T6.3.

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The WP1 team responsible for the preparation of D1.3 document deeply acknowledges:

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- The WP6 team responsible for the FAST: Guillaume Bour and Andrea N. Skytterholm (SINTEF)
- The WP3 team responsible for preparing the feedback forms: Dia Lykou and Stavroula Manouri (ICCS).

1 Introduction

1.1. Objectives

In the scope of *WP1 – Co-create & demonstrate systemic innovation in 6 LL*, the Innovation Alliance (InAll) of the B-WaterSmart (BWS) project was set up across the six Living Labs (LLs) of the project, Alicante, Bodø, Flanders, Lisbon, East Frisia and Venice, being a key co-production instrument of BWS project. InAll is tailored for the seven LL primary problem-owners (LL_i) (Flanders LL includes two primary problem-owners) to internalise and learn by doing how to use the B-WaterSmart objective-oriented assessment framework (BWS AF) as a key instrument for strategic planning, as introduced in the earlier deliverable relative to BWS collaborative work (Rebelo *et al*., 2021).

This document presents the first recommendations provided by the LL_i, within the InAll development. These results are to be used in the project to support both the refinement of BWS AF, under development in *WP6 – Water-smartness assessment framework*, and the dashboard-type software to facilitate its use, to be developed in *WP3 – Water-smart applications and data (T3.9 –Develop and deploy the water-smartness dashboard)*. Therefore, the results herein presented were obtained in close collaboration with WP6 and with contributions from T3.9.

1.2. Structure

After this chapter of introduction, Chapter 2 describes the approach followed to produce the recommendations within InAll. This includes a presentation of the InAll process and of the strategic planning, and an overview of the testing process of BWS AF version V_0, which was the focus of the analysis. Chapter 3 presents the feedback on the framework, collected from the InAll LL problem-owners, with support from WP6, and the respective analysis. Chapter 4 describes the recommendations for refinement of the framework and for developing the dashboard-type software that is a facilitator of its use. Chapter 5 presents the final remarks.

2 Approach

2.1 Overview

The recommendations were developed within the BWS InAll, in close collaboration with WP6 (Figure 1). InAll is a capacity-building initiative focused on strategic planning, thus requiring a performance assessment process. This performance assessment process is based on the assessment framework to support multi-stakeholder and strategic decision-making towards the transition to a water-smart society that recognises multiple values and facilitates the active participation of a varied set of actors (Ugarelli *et al*., 2022a).

Seven BWS LLi are participating at InAll, namely Aguas de Alicante, Municipality of Bodø, De WaterGroep and ProefStation (Flanders), Lisbon Municipality, OOWV (East Frisia) and Veritas (Venice), following a common phased program for the strategic planning developments.

The assessment framework BWS AF V_0 (MS16) was developed within WP6 (Ugarelli *et al*., 2022a) and constitutes the version used during the InAll for testing and for the first recommendations' provision. At InAll, a computational web-tool, FAST (**F**ramework **AS**essment **T**ool), which was developed by SINTEF within WP6 (Ugarelli *et al*., 2022b), was provided to the LLi for their first use of the framework, including the collection of feedback. Processing of the raw results from the two feedback rounds was carried out by WP6 (Ugarelli *et al*., 2022b), and provided to WP1, allowing a further analysis with focus on the recommendations to be carried out in WP1.

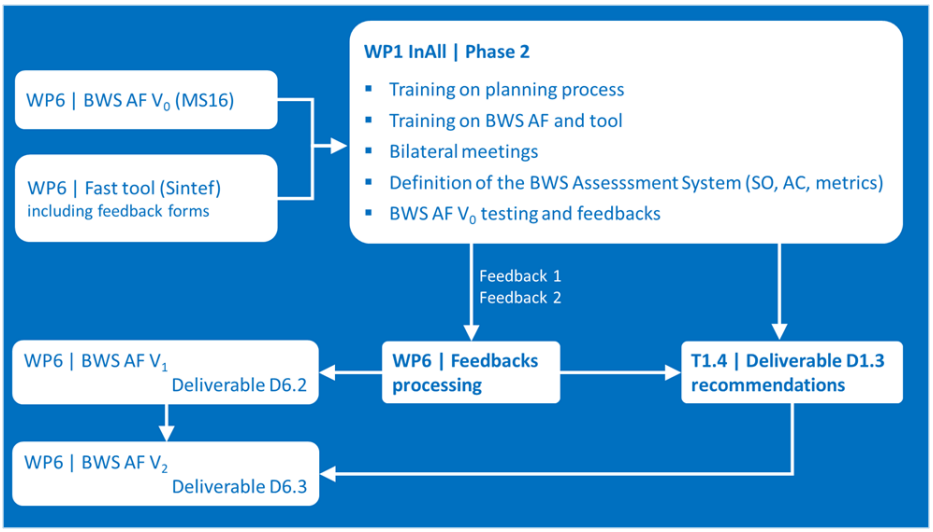

Figure 1: Overview of the recommendation's development approach

The present chapter includes a description of both the InAll and the strategic planning processes, and an overview of the BWS AF V_0 testing process.

2.2 The InAll process

The InAll process follows a 5-phased schedule program (Figure 2), to facilitate a common guidance to strategic planning, as well as the application of the BWS AF V_0. The tasks related to the BWS AF testing are highlighted in Phase 2 of the referred figure. Each phase has a particular work program, specifying the work to be developed by each LL_i team, and includes a dedicated training related to the partial objectives to be reached in the phase.

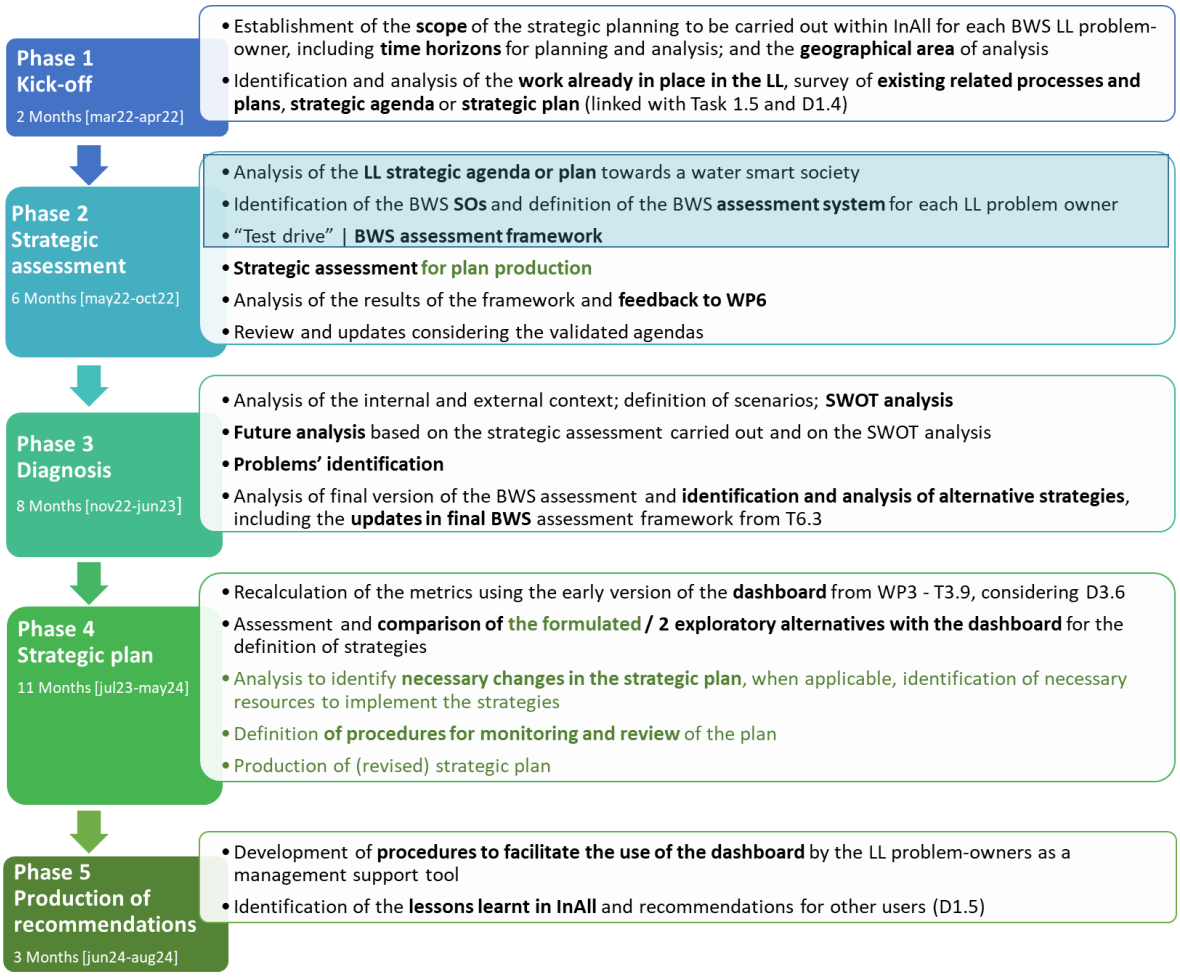

Figure 2: The InAll process | 5-phased schedule program

Phase 1 is dedicated to the establishment of the scope and time horizons of the strategic planning, and analysis of the work already in place in the LLi. Phase 2 focuses on the analysis of the LL strategic agenda towards a water smart society as defined in D6.1, to establish the strategic objectives and the assessment system. It also includes the "test drive" of the BWS AF to provide feedback to WP6. Phase 3 is dedicated to the SWOT analysis, definition of scenarios and prospective analysis, as well as identification of strategies, with the necessary updates considering the final BWS AF. Phase 4 focuses on the use of the early version of the dashboard for the metrics and comparison of alternatives. It also includes updates in the strategic plan, identification of resources needed and definition of procedures for plan monitoring and review. Phase 5 is dedicated to develop procedures to facilitate the use of the dashboard by the LL_i as a management support tool, and recommendations for other users.

In addition to these developments, InAll provides to the participants opportunities for sharing experiences, debating sessions and provision of improvement recommendations. The work developed by each LL_i is tailored to its specific context and needs.

2.3 Strategic planning

The strategic planning process towards a water-smart society followed by InAll is based on the AWARE-P approach (Alegre *et al*., 2012). The strategic planning level is characterised by a corporate and long-term view and aims at establishing and communicating the strategic priorities to staff and citizens. The main objectives of strategic planning are to:

- support, strengthen and provide coherence to the management decision process (identifying and addressing internal and external key factors that affect activity);
- improve the organisation's performance (the basis for subsequent management actions);
- provide a means to adapt the activity of the organisation to the changing needs of the society and the environment;
- develop objective-driven strategies leading to the achievement of the organisation objectives as a water service provider;
- produce a strategic plan, unique to the entire organisation.

At the strategic management and planning level, as for the tactical and operational levels, the planning process follows the structured closed loop presented in Figure 3 (Alegre *et al*., 2012; Alegre and Covas, 2015) including:

(i) definition of the objectives and of the assessment system (criteria, metrics, and reference values);
(ii) elaboration of a diagnosis, including identification of the main problems and definition of targets to be achieved;
(iii) elaboration of the plan, including the identification, comparison and selection of alternative solutions to overcome the problems identified in the diagnosis;
(iv) implementation of the plan; and
(v) monitoring, progress assessment, and review.

Planning process

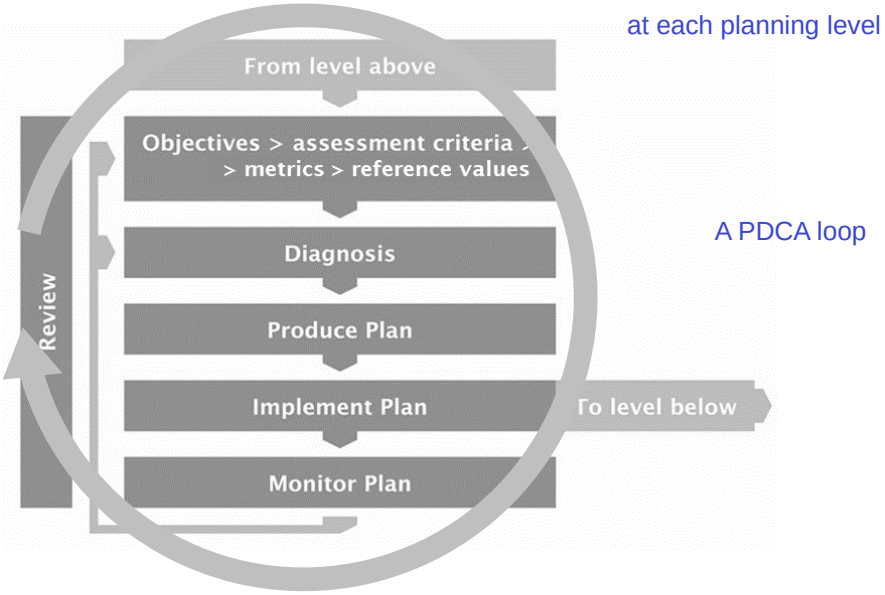

Figure 3: The planning process (adapted from Alegre *et al*., 2012; Alegre and Covas, 2015)

Most organisations have elements of this process already in place. What is often missing is a review mechanism, i.e., a way to measure compliance with set goals, as well as an effective alignment between the different management levels. At the strategic level, the definition of objectives needs to be aligned with the strategic agenda, the vision and mission of the organisation.

Setting up objectives and their assessment system (i), through the assessment criteria, metrics, and reference values, is a crucial stage in order to set up clear directions of action, as well as accountability of results through timely review (v) (Alegre *et al*., 2015). At InAll, this stage benefits from the use of the BWS AF.

2.4 Testing the B-Water Smart assessment framework V_0

2.4.1 Framework overview

The BWS AF main purposes are to i) support the organisations in the definition of long-term strategic objectives towards a water-smart society and in the assessment of achievement of these objectives; ii) help policy-makers and decision-makers to identify and overcome existing barriers and implement their strategic agendas towards a water-smart society; and iii) enable benchmarking by providing a minimum set of metrics that can be used for comparisons in relation to own objectives, in time and with other organisations (Ugarelli et al., 2021).

Considering the strategic planning process (section 2.3), the framework constitutes an assessment tool to support, at the strategic level, the establishment of the organisation assessment system, in order to carry out the diagnosis, support the decision-making and monitor the progress.

The framework is objective-driven and presents a tree structure, composed of objectives-criteria-metrics (Figure 4). The BWS AF V_0 has five strategic objectives (SOs), described through 17 assessment criteria (AC), and assessed by 73 metrics, with the corresponding reference values established for each metric.

An overview of the framework is presented in Table 1 and Table 2, and a detailed description of each component of this V_0 of the framework is provided by Ugarelli *et al*. (2022a).

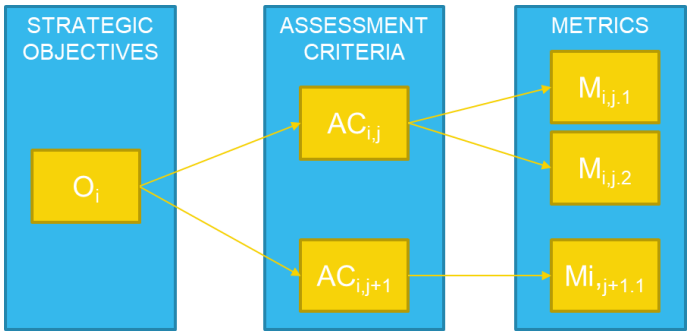

Figure 4: The BWS AF tree structure (Ugarelli *et al*., 2022a)

Table 1: BWS AF V_0 overview

STRATEGIC OBJECTIVES	ASSESSMENT CRITERIA	NUMBER OF METRICS
A. Ensuring water for all relevant uses	A.1 Safe and secure fit-for-purpose water provision	6
	A.2 Accessibility and equity (for people and for other uses)	5
	A.3 Financial viability	3
	Total A	**14**
B. Safeguarding ecosystems and their services to society	B.1 Safeguarded water ecosystems	3
	B.2 Enhanced ecosystem services to society	5
	B.3 Resource efficiency	6
	Total B	**14**
C. Boosting value creation around water	C.1 Circular policy making	5
	C.2 Circular economy growth	3
	C.3 Resource recovery and efficient use	7
	Total C	**15**
D. Promoting adaptive change towards resilient infrastructure	D.1 Enabling planning to promote adaptive change towards circularity and resilience	1
	D.2 Implementing adaptive change towards resilient infrastructure	2
	D.3 Effectiveness of the adaptive change towards resilient infrastructure (Diagnosis)	9
	Total D	**12**
E. Engaging citizens and actors across sectors in continuous co-learning and innovation	E.1 Awareness	4
	E.2 Multi-sector network potential	4
	E.3 Stakeholder engagement processes	4
	E.4 Capacity building	3
	E.5 Information and knowledge sharing	3
	Total E	**18**
TOTAL FRAMEWORK		**73**

Table 2: Assessment criteria and metrics of BWS AF V_0 (Ugarelli *et al.*, 2022a)

Assessment Criteria (AC)	Metrics
A.1 Safe and secure fit-for-purpose water provision	A.1.1 Water resource exploitation index, plus (WEI+)
	A.1.2 Alternative water resource exploitation index (AWEI)
	A.1.3 Safe drinking water
	A.1.4 Compliant reclaimed water
	A.1.5 Security and resilience index – drinking water (DW)
	A.1.6 Security and resilience index – wastewater (WW)
A.2 Accessibility and equity (for people and for other uses)	A.2.1 Physical access to water supply (households and small businesses)
	A.2.2 Physical access to water supply in public spaces for quality of life
	A.2.3 Physical access to water supply (industrial use)
	A.2.4 Agriculture area with access to water for irrigation
	A.2.5 Number of points with potential conflicts of water use
A.3 Financial viability	A.3.1 Consumer willingness to pay
	A.3.2 Affordability
	A.3.3 Financial continuation
B.1 Safeguarded water ecosystems	B.1.1 Minimum water flow
	B.1.2 Effective stormwater treatment
	B.1.3 Effective wastewater treatment
B.2 Enhanced ecosystem services to society	B.2.1 Benefits from regulating services (water quality)
	B.2.2 Maintaining nursery populations and habitats
	B.2.3 Regulation of extreme events
	B.2.4 Water provision by ecosystem
	B.2.5 People enjoying cultural ecosystem services
B.3 Resource efficiency	B.3.1 Water footprint for drinking water
	B.3.2 Water footprint for wastewater
	B.3.3 Carbon footprint for drinking water
	B.3.4 Carbon footprint for wastewater
	B.3.5 Energy consumption
	B.3.6 Drinking water consumption
C.1 Circular policy making	C.1.1 Statutory compliance
	C.1.2 Preparedness
	C.1.3 Policy instruments
	C.1.4 Green public procurement
	C.1.5 Level of ambition
C.2 Circular economy growth	C.2.1 By-products recovery revenues
	C.2.2 Green jobs
	C.2.3 Circular economy business models in practice
C.3 Resource recovery and efficient use	C.3.1 Water-related materials recovery
	C.3.2 Fertilizer production avoided

Assessment Criteria (AC)	Metrics
	C.3.3 Sludge beneficial use
	C.3.4 Water consumption from other sources
	C.3.5 Reclaimed water use
	C.3.6 Reclaimed water production
	C.3.7 Energy production
D.1 Enabling planning to promote adaptive change towards circularity and resilience	D.1.1 Infrastructure Planning Index for Adaptive Change
D.2 Implementing adaptive change towards resilient infrastructure	D.2.1 Infrastructure Value Index
	D.2.2 Infrastructure Implementation Index for Adaptive Change
D.3 Effectiveness of the adaptive change towards resilient infrastructure (Diagnosis)	D.3.1 Linear water losses
	D.3.2 Water storage capacity
	D.3.3 Water retention
	D.3.4 Incident occurrences
	D.3.5 Combined Sewer Overflows
	D.3.6 Time for restoration
	D.3.7 Level of autonomy (of infrastructure)
	D.3.8 Level of redundancy
	D.3.9 Treatment capacity utilization
E.1 Awareness	E.1.1 Knowledge and education
	E.1.2 Local sense of urgency
	E.1.3 Hydrocitizenship
	E.1.4 Discourse embedding
E.2 Multi-sector network potential	E.2.1 Clear division of responsibility
	E.2.2 Network Cohesion
	E.2.3 Authority
	E.2.4 Room to maneuver
E.3 Stakeholder Engagement processes	E.3.1 Stakeholder inclusiveness
	E.3.2 Protection of core values
	E.3.3 Progress and variety of options
	E.3.4 Collaborative agents
E.4 Capacity building	E.4.1 Smart monitoring
	E.4.2 Evaluation
	E.4.3 Cross-stakeholder learning
E.5 Information and knowledge sharing	E.5.1 Information availability and use
	E.5.2 Information transparency and sharing
	E.5.3 Knowledge cohesion

2.4.2 InAll testing process

According to the InAll program, presented in Figure 2, the BWS AF is to be applied as a tool for strategic planning in Phases 2, 3 and 4, in order to:

i) establish the objectives and the assessment system for the organisation towards a water-smart society;
ii) carry out a diagnosis for the identification of the problems and potential solutions;
iii) support decision on strategies to be implemented.

InAll provides, on the one hand, a chance for the LL problem-owners to learn by doing and share their experiences on using the BWS AF and, on the other hand, a privileged opportunity for the BWS AF developers to receive their feedbacks on the framework. These aspects were included during the testing process. The aim of the InAll testing process was twofold: to deliver the BWS AF V_0 (provided by WP6 (Ugarelli *et al*., 2022a)) to the InAll LL_i, and getting feedback of the BWS AFV_0 to the developers (information flow from WP1 (InAll) to WP6, Figure 1).

The feedback of LL_i can be clustered into:

i) **specific feedback for each strategic objective, criteria, and metric of the framework | feedback 1**, aiming at assessing particular aspects such as the clarity of description, existing gaps, the feasibility of computation, data sources, among others, in order to produce an updated version of the framework BWS AF V_1, mainly constituting the focus of deliverable D6.2 (Ugarelli *et al*., 2022b). From this specific feedback, the information addressing the objective level (questions related to the clarity of assessment criteria (AC) and completeness of the objective description by the different points of view), the criteria level (lack of metrics in the assessment criteria and misplaced metrics between criteria), and the metrics level (relevance for strategic level, availability of data, and adequacy of reference values to conduct the diagnosis in the strategic planning process) is analysed in chapter 3, in the perspective of this deliverable D1.3, as it is essential for the recommendations related to the use of the framework within the planning process;
ii) **generic feedback about the framework | feedback 2**, aiming at assessing whether the framework fits the purpose of **strategic planning** (Figure 3) and receiving suggestions regarding its use through a dashboard-type software; this feedback is also presented and analysed in chapter 3.

More precisely, the questions addressed to the InAll LL_i (Ugarelli *et al*., 2022b) that are relevant for the present deliverable, i.e., to development the recommendations,

are presented in the appendix.

Processing of the raw results from the two feedback rounds was carried out by Ugarelli *et al*. (2022b) within WP6. In the present deliverable, a further analysis of the results, with focus on the recommendations, was carried out and is presented in chapter 3.

One essential aspect for the implementation of this validation process was the close collaboration and articulation between the two tasks involved in these developments WP1/T1.4 (InAll) and WP6/T6.2 (BWS AF), and their respective partners.

The FAST web-application was used to test BWS AF V_0. FAST (Figure 1) was developed by SINTEF within WP6 to facilitate the validation phase process. The benefits of using the FAST tool were increased user friendliness by transforming the excel-based BWS AF V_0 into a web-based application, facilitation of reporting, and the provisioning of a hands-on experience for the InAll LL_i including simple features for the assessment's visualization and for navigation within different parts of the framework (Ugarelli *et al*. 2022a). Additionally, the FAST simplified the feedback process including feedback forms, allowing organised and structured feedback from InAll. WP6 carried out the training on the BWS AF V_0 and the FAST to InAll.

The BWS AF V_0 validation was planned within InAll Phase 2 from April to September 2022 (M20-M24). The validation phase was extended for one month, until M25, to accommodate the availability of the project partners, as the period coincided with the annual summer vacation. Phase 2 builds upon the work carried out during Phase 1with respect to the establishment of the scope of the strategic planning for each BWS LL_i, including time horizons for planning and analysis and the geographical area of analysis; the analysis of the work already in place in the LL_i including existing related processes and plans, strategic agenda or strategic plan in each organisation.

2.4.3 Characterisation of the LL problem-owners

The scope of the strategic planning developed within InAll is at the organisation level, i.e., each BWS LL_i, develops its own planning. Given the different missions, characteristics, locations, contexts and dimensions, the set of organisations involved represents a diversity of scales and scopes. However, one of the LL_i decided to apply the planning process at LL scale instead at the organisation scale, allowing to extend the BWS AF V_0 feedback to the applicability at a LL level. A brief anonymously characterization of the six organisations (out of seven) which provided their feedback, including the strategic objectives according to the LL strategic agendas and the LL expected impacts (EI) of the project results, is presented in Table 3, as this is an important information to support and explain the main

developments, concerns, objectives, and decisions taken by each organisation towards a water-smart society.

Table 3: Brief characterization of each LL_i which provided feedback on BWS AF V_0

LL_i		LL_1	LL_2	LL_3	LL_4	LL_5	LL_6
Water services		Water supply and wastewater treatment	Water supply, transport, storage, and production	Water supply, wastewater treatment	Water supply and wastewater drainage and treatment	Water supply and sewerage, regenerated water for agriculture and urban uses	Wastewater and stormwater management; water reuse
LL challenges		• Increasing water demand by industry and agriculture • Untapped efficiency potential water resources allocation	• High drinking water demand due to dense population • High irrigation water demand for agriculture • Groundwater overexploitation • Water quality deterioration • Water scarcity due to climate change	• Need for reuse and recovery schemes for wastewater and sludge • Limitations to reuse and recovery due to low acceptance • Untapped efficiency potential (water & resource valorisation)	• Decrease leaks in drinking water network and infiltration in the wastewater network • Increase efficiency potential on water use • Increase energy recovery, reuse excess heat • Increase resilience to climate change	• Boosting sustainable and circular economy around water through water reuse and resource recovery	• Distance from freshwater sources • Need to increase urban green areas • Growing population • Economy
Strategic objectives according to LL agenda	SO A	x	x	x	x	x	x
	SO B	x	x	-	x	x	x
	SO C	-	x	x	x	x	x
	SO D	x	-	x	-	x	x
	SO E	x	x	x	-	x	x
LL expected impacts of project results	EI 1	x	-	-	x	x	x
	EI 2	x	x	-	x	-	x
	EI 3 + 4	x	x	x		x	x
	EI 5	-	-	x	x	x	x
	EI 6	-	-	x	x	x	-
	EI 7	x	-	x	-	x	x
	EI 8	-	x	-	-	x	-
	EI 9	-	-	-	x	x	-

Strategic objectives: SO A: Ensuring water for all relevant uses; SO B: Safeguarding ecosystems and their services to society; SO C: Boosting value creation around water; SO D: Promoting adaptive change towards resilient infrastructure; SO E. Engaging citizens and actors across sectors in continuous co-learning and innovation
Expected Impacts: EI 1. Decrease in use of freshwater resources; E1 2. Improved water used efficiency; EI 3 + 4. Water reuse; EI 5. Reduction in water related energy use; EI 6. Energy recovery; EI 7. Nutrient recovery; EI 8. Mineral recovery; EI 9. Recovery of other relevant resources

3 B-Water Smart Assessment framework feedback from InAll

3.1 Overview of feedback 1 | specific feedback for each strategic objective, criteria, and metric of the framework

3.1.1 Strategic objective level

As described in section 2, six (out of seven) LL_i provided feedback on each of the three levels of the BWS AF V_0 – strategic objectives, assessment criteria and metrics. At the SO level, questions were relative to the clarity and need for revision of each AC. Additionally, the LL_i were asked to answer if all relevant points of view are covered for each SO. Figure 5 and Table 4 anonymously summarise the answers received from each LL_i.

Table 4: Overview of the six LL_i feedback on the clarity and need for revision of the assessment criteria and on relevant points of view missing in each strategic objective.

SO	ACs unclear						ACs to be revised						Are all points of view covered?
	LL_1	LL_2	LL_3	LL_4	LL_5	LL_6	LL_1	LL_2	LL_3	LL_4	LL_5	LL_6	
A	Y	-	N	N	N	N	Y	-	N	N	N	N	• Availability of funding for water smart services; qualitative conditions of water resources are only partially covered, most indicators focus quantity of available resources • Existence of in-depth studies of future water demand and water availability (considering the impact of climate change) and strategies for adaptation
B	Y	-	N	N	Y	N	Y	-	N	-	Y	N	• B.1.3 lacks the possibility for ambition. For instance, to measure goals that exceed the minimum requirements for wastewater treatment • Renewable energy consumption/production
C	Y	-	N	N	N	N	-	-	N	-	N	N	• Other circularities: external reused products used in water related activities (e.g., chemicals), vehicles (use of hybrid/electric vehicles), reuse/recycle of other elements (e.g., replaced pipes)
D	Y	-	N	N	N	N	Y	-	N	-	Y	N	• Governance of climate change adaptation
E	N	-	N	N	N	-	Y	-	N	-	Y	-	• The SO is relevant but should be reduced to 2-3 ACs; otherwise, the topic is overrated in contrast to the other SOs
Legend	Q: Indicate if there is any AC which is not clear? Y: yes; N: no						Q: Indicate if there is any AC which needs to be revised? Y: yes; N: no						

LL_2 do not answer to this level of questions

Overall (Figure 5), per LL_i, the answers varied from all SOs being clear to 4 out of 5 being unclear (rows A to D, Table 4). SOs A, C, D, E gathered a 4/6 score on AC clarity, whereas SO B gathered a 3/6 score. As so, the LL problem-owners indicated some ACs need to be revised, particularly those of SO E (only one LL_i considered no need for AC revision) and of SOs B and D (only two LL_i considered no revision was needed). SO C was assessed as not having explicit need for AC revision, but only 50% of the LL_i answered. SO A shows the best results both for AC clarity and need for revision. The LL_i answers on relevant points of view covered helped to draw the recommendations on AC revision and improvement.

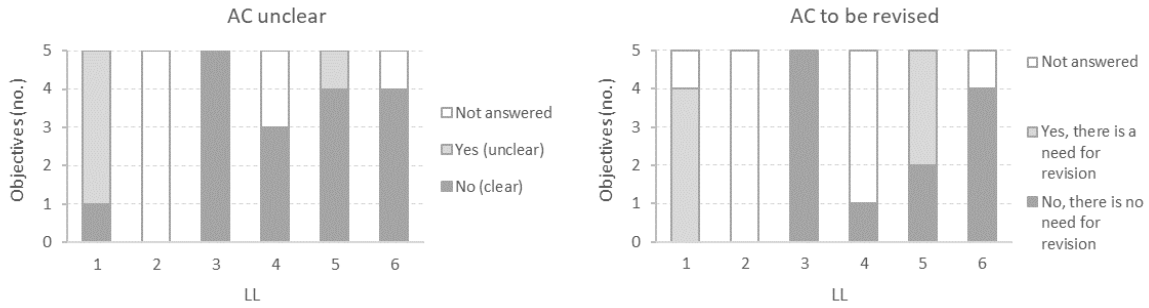

Figure 5: Overall feedback at the strategic objectives level, per LL_i

3.1.2 Assessment criteria level

At the assessment criteria level, the focus was on the lack of metrics in some ACs and misplaced metrics between ACs. Table 5, Figure 6 and Figure 7 anonymously summarize the answers of each LL_i.

The high number of no answers may bias this analysis; nevertheless, Figure 6 shows that for two LL_i there is no lack of metrics in the ACs, whereas for one LL_i the majority (10/17) of the ACs are lacking metrics.

Per SO (Figure 7), the results indicate that SO A is the most complete, with only one LL_i mentioning a lack of metrics in one AC (A.1, Table 5). One LL_i reported two ACs in SOs B (B.2) and C (C.2) should include other metrics, as well as one LL_i in one AC of SO D (D.2). One LL_i reported a lack of metrics in all objectives.

Regarding misplaced metrics between ACs, there were only two positive answers – one LL_i reported its existence in one AC of SO A (A.1, Table 5) and another LL_i in one AC of SO E (E.1, Table 5). In addition, some LL_i comments addressed the “B.3 Resource efficiency” and “C.3 Resource recovery and efficient use” complementarity and similarity, since both ACs focus on resource efficiency. However, while SO B assesses resource efficiency (water and energy/carbon footprint) for safeguarding ecosystems and their services to society, SO C targets

resource recovery around water. All resources, including the water-recovered ones, should be used efficiently, but this is not addressed in the metrics considered in SO C and may therefore be omitted – thus, the metrics are not misplaced among ACs B.3 and C.3.

Table 5: Overview of the LL_i feedback on the lack and misplacement of metrics in each assessment criteria.

SO	AC	Lack of metrics in the AC						Misplaced metrics between ACs					
		LL_1	LL_2	LL_3	LL_4	LL_5	LL_6	LL_1	LL_2	LL_3	LL_4	LL_5	LL_6
A	A.1	-	-	N	N	Y	N	-	-	Y	N	N	N
	A.2	-	-	N	-	N	N	-	-	N	-	N	N
	A.3	-	-	N	N	N	-	-	-	N	N	N	-
B	B.1	-	-	N	-	Y	N	-	-	N	-	N	N
	B.2	Y	-	N	-	Y	N	N	-	N	-	N	N
	B.3	-	-	N	-	Y	N	-	-	N	-	N	N
C	C.1	N	-	N	-	Y	N	N	-	N	-	N	N
	C.2	Y	-	N	-	N	N	N	-	N	-	N	N
	C.3	N	-	N	-	Y	N	-	-	N	-	N	N
D	D.1	N	-	N	-	N	N	N	-	N	-	N	N
	D.2	N	-	N	Y	Y	N	N	-	N	-	N	N
	D.3	N	-	N	-	Y	N	N	-	N	-	N	N
E	E.1	N	-	N	-	N	-	Y	-	N	-	N	-
	E.2	N	-	N	-	-	-	-	-	N	-	-	-
	E.3	N	-	N	-	N	-	N	-	N	-	N	-
	E.4	N	-	N	-	Y	-	N	-	N	-	N	-
	E.5	N	-	N	-	Y	-	N	-	N	-	N	-
Legend		Q. Are there other (missing) related metrics that need to be included in the AC? Y: yes; N: no						Q. Are there metrics which are misplaced (placed in the wrong AC)? Y: yes; N: no					

LL_2 do not answer to this level of questions

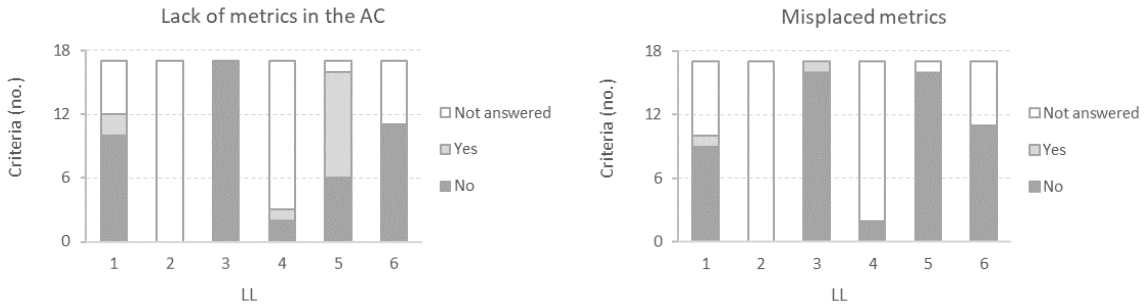

Figure 6: Overall feedback of each LL_i at the assessment criteria level

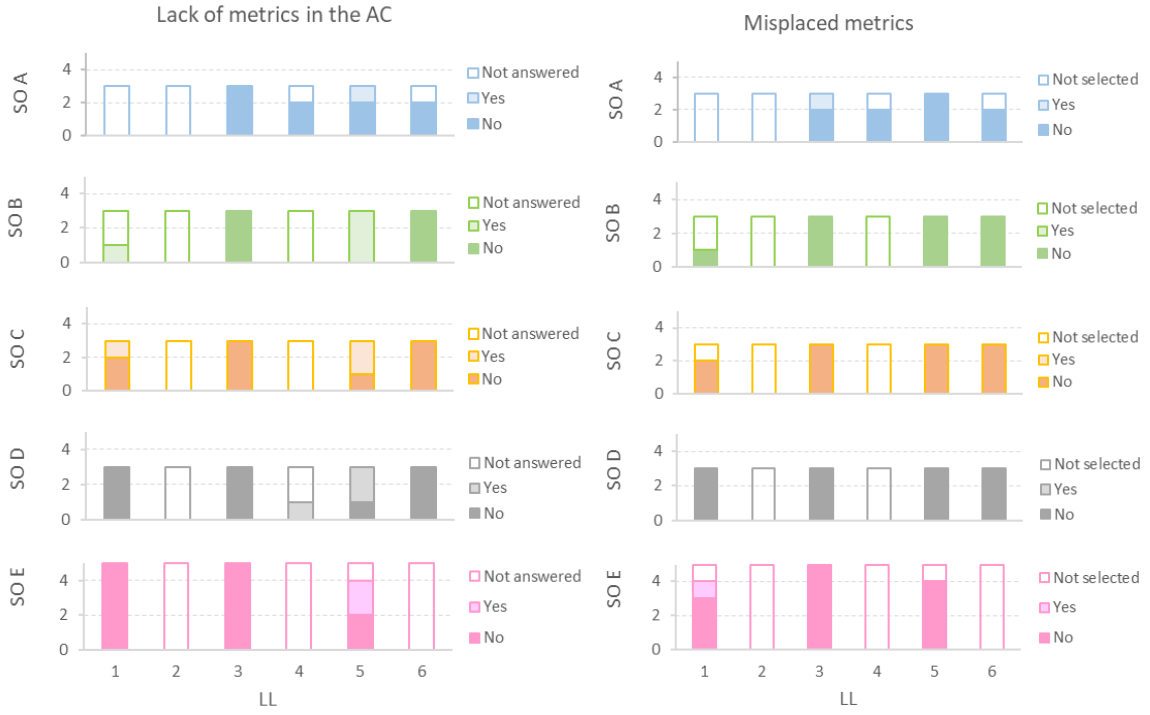

Figure 7: LL_i feedback on the assessment criteria per objective, regarding the lack of metrics or misplaced metrics among assessment criteria

3.1.3 Metric level

Regarding the LL_i feedback at the metrics level, this report focuses on the metrics' relevance at the strategic level, the availability of data and the adequacy of the reference values to conduct the diagnosis during the strategic planning process. Table 6 anonymously summarizes the answers of each LL_i to these questions.

Table 6: Overview of the LL_i feedback on the metrics relevance, data availability and reference values adequacy at strategic level.

SO	Metric	Relevant at strategic level						Data availability						Adequate reference values					
		LL_1	LL_2	LL_3	LL_4	LL_5	LL_6	LL_1	LL_2	LL_3	LL_4	LL_5	LL_6	LL_1	LL_2	LL_3	LL_4	LL_5	LL_6
A	A.1.1	N	-	Y	-	N	-	N	-	S	-	N	-	-	-	-	-	Y	-
	A.1.2	Y	-	N	-	Y	Y	N	F	-	-	S	S	-	-	-	-	Y	Y
	A.1.3	N	Y	N	Y	Y	-	F	S	-	S	F	-	-	Y	-	Y	Y	-
	A.1.4	N	Y	Y	-	Y	Y	N	S	F	-	F	S	-	N	N	-	Y	Y
	A.1.5	Y	-	N	-	Y	Y	S	-	-	-	S	S	-	-	-	-	Y	Y
	A.1.6	N	-	Y	-	Y	Y	S	-	F	-	S	S	-	-	Y	-	Y	Y
	A.2.1	Y	-	Y	-	Y	-	S	-	F	-	S	-	-	-	N	-	Y	-
	A.2.2	Y	-	N	-	N	Y	N	-	N	-	N	S	-	-	Y	-	N	Y
	A.2.3	Y	-	Y	-	N	-	F	-	F	-	F	-	-	-	N	-	Y	-
	A.2.4	-	-	Y	-	N	Y	-	-	F	-	N	S	-	-	Y	-	N	Y
	A.2.5	Y	-	Y	-	N	-	N	-	F	-	N	-	-	-	Y	-	N	-
	A.3.1	Y	Y	N	-	Y	-	N	S	S	-	S	-	-	Y	Y	-	N	-
	A.3.2	Y	Y	N	-	Y	-	N	S	S	-	S	-	-	Y	Y	-	Y	-
	A.3.3	-	Y	Y	Y	Y	-	-	S	S	S	S	-	-	Y	Y	Y	Y	-
B	B.1.1	-	-	Y	-	N	-	-	-	S	-	N	-	-	-	Y	-	N	-
	B.1.2	Y	-	Y	-	N	Y	N	-	N	-	S	S	-	-	N	-	N	Y
	B.1.3	-	-	Y	-	Y	-	-	-	F	-	S	-	-	-	Y	-	Y	-
	B.2.1	Y	-	N	-	Y	-	N	-	N	-	S	-	-	-	Y	-	N	-
	B.2.2	N	-	Y	N	N	-	S	-	S	S	N	-	-	-	Y	Y	N	-
	B.2.3	Y	-	N	-	N	Y	N	-	N	-	S	S	-	-	Y	-	N	Y
	B.2.4	Y	-	Y	-	N	-	F	-	F	-	N	-	-	-	Y	-	N	-
	B.2.5	N	N	Y	Y	N	Y	S	S	S	N	S	S	-	Y	Y	-	N	Y
	B.3.1	N	-	N	-	Y	-	S	-	S	-	S	-	-	-	Y	-	Y	-
	B.3.2	-	-	Y	-	N	Y	-	-	S	-	S	N	-	-	Y	-	Y	Y
	B.3.3	Y	Y	N	-	Y	-	S	S	S	-	S	-	-	N	Y	-	Y	-
	B.3.4	-	-	Y	Y	-	Y	-	-	S	S	S	S	-	-	Y	Y	Y	Y
	B.3.5	Y	Y	Y	Y	Y	Y	S	S	S	S	S	F	-	Y	Y	Y	Y	Y
	B.3.6	Y	Y	N	Y	Y	Y	F	S	F	-	S	F	-	Y	Y	Y	Y	Y
C	C.1.1	Y	Y	Y	-	Y	-	S	S	S	-	S	-	-	Y	Y	-	Y	-
	C.1.2	Y	Y	Y	Y	Y	-	S	S	S	S	S	-	-	Y	Y	-	Y	-
	C.1.3	Y	Y	Y	Y	Y	-	S	S	S	S	S	-	-	Y	Y	-	Y	-
	C.1.4	N	-	N	Y	N	N	F	-	S	S	N	S	-	-	Y	N	N	N
	C.1.5	N	Y	Y	Y	Y	-	S	S	S	F	S	-	-	Y	Y	-	Y	-
	C.2.1	Y	Y	Y	-	Y	-	S	S	S	-	S	-	-	Y	Y	-	Y	-
	C.2.2	Y	-	Y	-	-	N	F	-	N	-	S	S	-	-	Y	-	Y	Y
	C.2.3	Y	-	Y	-	N	-	F	-	N	-	S	-	-	-	Y	-	Y	-
	C.3.1	Y	-	Y	-	Y	-	S	-	S	-	S	-	-	-	Y	-	Y	-
	C.3.2	Y	-	Y	-	Y	Y	N	-	S	-	S	S	-	-	Y	-	Y	Y

SO	Metric	Relevant at strategic level						Data availability						Adequate reference values					
		LL_1	LL_2	LL_3	LL_4	LL_5	LL_6	LL_1	LL_2	LL_3	LL_4	LL_5	LL_6	LL_1	LL_2	LL_3	LL_4	LL_5	LL_6
	C.3.3	-	-	Y	-	Y	-	-	-	F	-	F	-	-	-	Y	-	Y	-
	C.3.4	Y	-	Y	-	Y	Y	S	-	S	-	S	S	-	-	Y	-	Y	Y
	C.3.5	-	-	N	-	Y	Y	-	-	-	-	S	F	-	-	-	-	-	Y
	C.3.6	-	-	Y	-	Y	-	-	-	S	-	F	-	-	-	Y	-	Y	-
	C.3.7	Y	-	Y	-	Y	-	F	-	S	-	F	-	-	-	Y	-	Y	-
D	D.1.1	Y	-	N	Y	Y	Y	S	-	S	S	S	N	-	-	Y	Y	Y	Y
	D.2.1	Y	-	N	-	Y	Y	S	-	-	-	S	S	-	-	-	-	Y	Y
	D.2.2	Y	-	N	Y	Y	Y	S	-	-	S	S	N	-	-	-	-	Y	Y
	D.3.1	Y	Y	N	Y	Y	Y	F	S	-	S	F	N	-	Y	-	Y	Y	Y
	D.3.2	Y	Y	N	-	Y	Y	F	S	-	-	F	S	-	Y	-	-	Y	Y
	D.3.3	Y	-	N	-	N	-	N	-	-	-	S	-	-	-	-	-	N	-
	D.3.4	Y	-	N	-	Y	Y	F	-	-	-	F	S	-	-	-	-	Y	Y
	D.3.5	Y	-	Y	Y	Y	Y	F	-	S	S	S	S	-	-	Y	-	-	Y
	D.3.6	Y	-	N	-	Y	Y	S	-	-	-	S	S	-	-	-	-	N	Y
	D.3.7	Y	-	N	-	Y	-	S	-	-	-	S	-	-	-	-	-	N	-
	D.3.8	-	-	N	-	Y	Y	-	-	-	-	S	S	-	-	-	-	N	Y
	D.3.9	Y	-	N	-	Y	-	F	-	S	-	F	-	-	-	Y	-	N	-
E	E.1.1	Y	Y	Y	-	Y	-	F	S	S	N	S	-	-	Y	Y	Y	Y	-
	E.1.2	Y	Y	Y	-	Y	-	F	S	S	-	S	-	-	Y	Y	-	Y	-
	E.1.3	Y	Y	Y	-	N	-	F	S	S	-	S	-	-	Y	Y	-	Y	-
	E.1.4	N	Y	Y	-	N	-	F	S	S	-	S	-	-	Y	Y	-	Y	-
	E.2.1	Y	Y	Y	-	Y	-	F	S	S	-	S	-	-	Y	Y	-	Y	-
	E.2.2	Y	Y	Y	-	N	-	F	S	S	-	S	-	-	Y	Y	-	Y	-
	E.2.3	Y	Y	Y	-	-	-	F	S	S	-	-	-	-	N	Y	-	-	-
	E.2.4	Y	Y	Y	-	Y	-	F	S	S	-	S	-	-	N	Y	-	Y	-
	E.3.1	Y	Y	Y	-	Y	-	F	S	S	-	S	-	-	Y	Y	-	Y	-
	E.3.2	-	Y	Y	-	Y	-	-	S	S	-	S	-	-	Y	Y	-	Y	-
	E.3.3	-	Y	Y	-	Y	-	-	S	S	-	S	-	-	Y	Y	-	Y	-
	E.3.4	-	Y	Y	-	Y	-	-	S	S	-	S	-	-	N	Y	-	Y	-
	E.4.1	N	Y	Y	-	N	-	-	S	S	-	N	-	-	Y	Y	-	N	-
	E.4.2	-	Y	Y	-	Y	-	-	S	S	-	S	-	-	Y	Y	-	Y	-
	E.4.3.	-	Y	Y	-	Y	-	-	S	S	-	S	-	-	Y	Y	-	Y	-
	E.5.1	N	Y	Y	-	Y	-	-	S	S	-	S	-	-	Y	Y	-	Y	-
	E.5.2	N	Y	Y	-	Y	-	-	S	S	-	S	-	-	Y	Y	-	Y	-
	E.5.3	N	Y	Y	-	N	-	-	S	S	-	S	-	-	Y	Y	-	Y	-
	Legend	Q. State if this metric is relevant for planning at the strategic level? Y: yes; N: no						Q. State if all necessary data are available for evaluating the metric? F: Fully available; S: Sufficient info available to provide valuable insights; N: Not available						Q. Are the reference values adequate in your context? Y: yes; N: no					

Figure 8 presents the number of metrics assessed as relevant at the strategic level by each LL_i, which varies between 14 and 50 metrics out of a total of 73. Some metrics were not selected due to the LL_i context, and 14 to 24 metrics were identified as not relevant at the strategic level. However, it is important to emphasise that no metric was considered irrelevant by all LL_i; on the other hand, only one metric (B.3.5 Energy consumption) was selected as relevant by all LL_i (highlighted in dark blue in Table 6). Three metrics (highlighted in light blue in Table 6) were selected by all LL_i but considered not relevant at the strategic level by some LL_i.

An unexpected observation relates to the fact that some metrics that were defined based on the expected impacts of the project, such as reclaimed water use (C3.4-3.6, highlighted in purple in Table 6), were not selected by any LL_i.

When looking at each objective (Figure 9), it is possible to identify that, in general, strategic objectives A and B are those where more metrics are considered not relevant at the strategic level. Additionally, concerning strategic objective D, one LL_i identified 11 metrics out of a total of 12 as not relevant, and two LL_i did not select any metric of SO E.

A relevant issue for metric feasibility is data availability. Figure 10 presents the number of metrics with data fully available, sufficiently available or not available. Unavailable data was indicated for 2 to 12 metrics, sufficient information available to provide valuable insights was selected for 12-53 metrics, and fully available data for 1 to 22 metrics. No metric was identified as having data unavailable in all LL_i (Table 6). Most issues concerning data availability are connected to SOs A and B for which more of the selected metrics have unavailable data (Figure 11).

Concerning the adequacy of the proposed reference values, Figure 12 shows that that two LL_i identified one metric with no adequate reference values in their contexts, while the other LL_i identified four, five, and 18 metrics, respectively. Three metrics (highlighted in orange in Table 6) were considered by more than one LL_i with no adequate reference values, namely A.1.4 Compliant reclaimed water, B.1.2 Effective stormwater treatment and C.1.4 Green public procurement in terms of the number of contracts. SO B features most metrics with no adequate reference values (Figure 13).

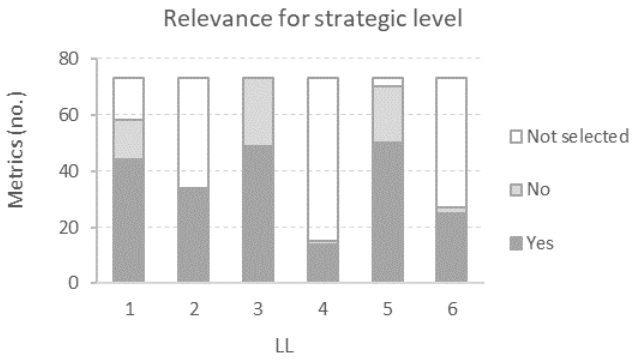

Figure 8: Overall feedback of each LL_i at the metrics level, regarding the relevance for strategic level

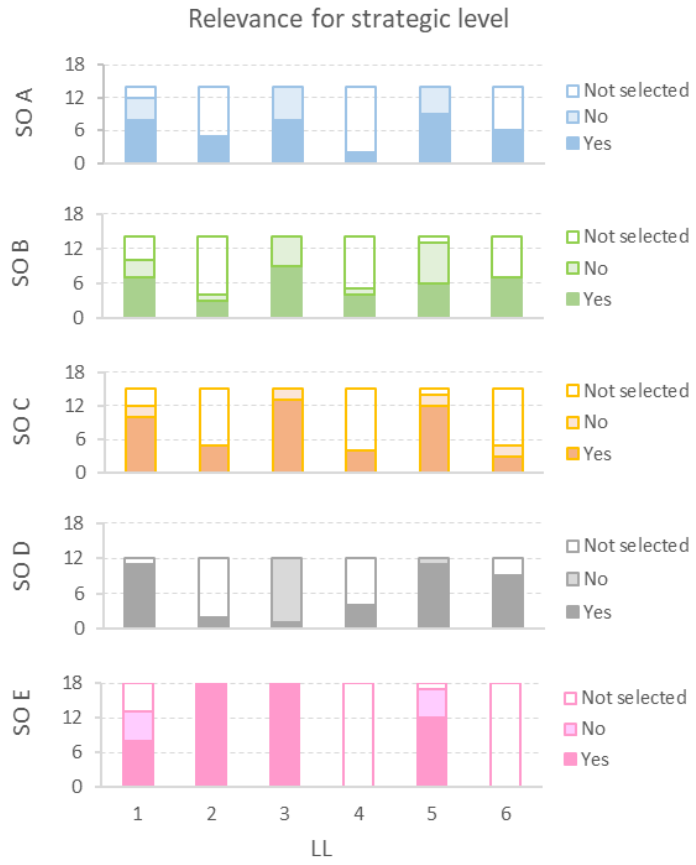

Figure 9: LL_i feedback on the metrics per objective, regarding the relevance for strategic level

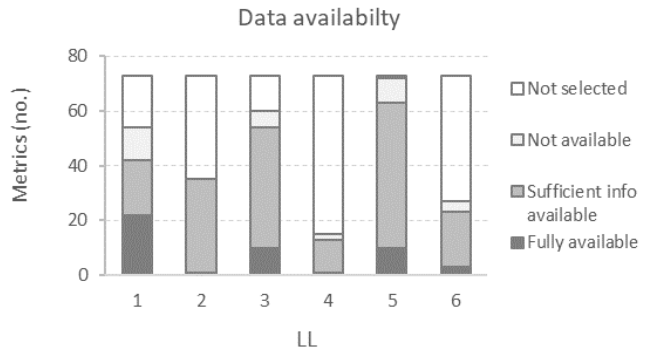

Figure 10: Overall feedback of each LL_i at the metrics level regarding the data availability

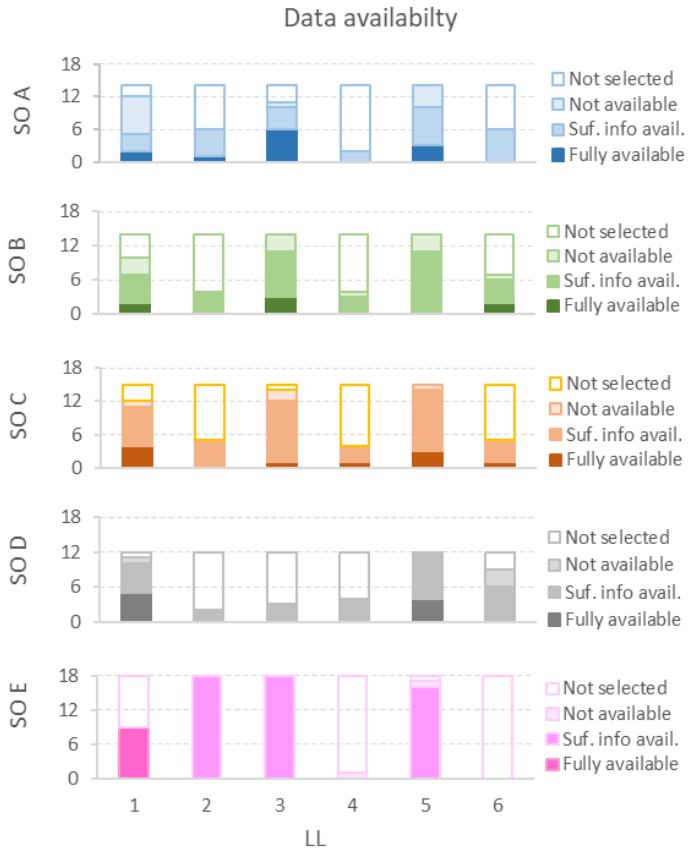

Figure 11: LL_i feedback on the metrics per objective, regarding the data availability

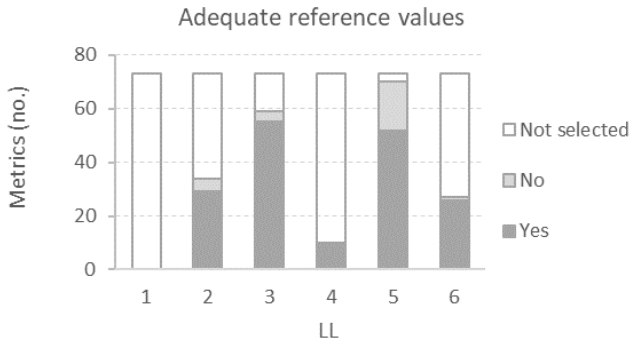

Figure 12: Overall feedback of each LL_i at the metrics level regarding the reference values

Figure 13: LL_i feedback on the metrics per objective, regarding the reference values

3.2 Overview of feedback 2 | generic feedback about the framework

The second feedback provided by each LL_i was related to the framework applicability as a strategic planning tool. For that, each LL problem-owner answered six questions (already described in section 2) and the aggregated results are presented in Figure 14.

Five of the six LL_i consider that the BWS AF is feasible (Q1), fits the purpose of supporting strategic planning (Q2), is useful for developing new strategic plans (Q3), for diagnosing and identifying improvement opportunities (Q5), and exploring alternatives (Q6). One LL_i considers BWS AF useful only for developing new strategic plans (Q3) and for diagnosing (Q5). Related to revising and monitoring the implementation of existing strategic plans (Q4), three LL_i considered BWS AF to be useful, one LL_i replied that it was not useful, and two LL_i did not answer, since this feedback was provided at an early stage of the planning process, before having an overview of the BWS AF full application.

The specific comments provided by the LL_i to each question are presented in Table 7.

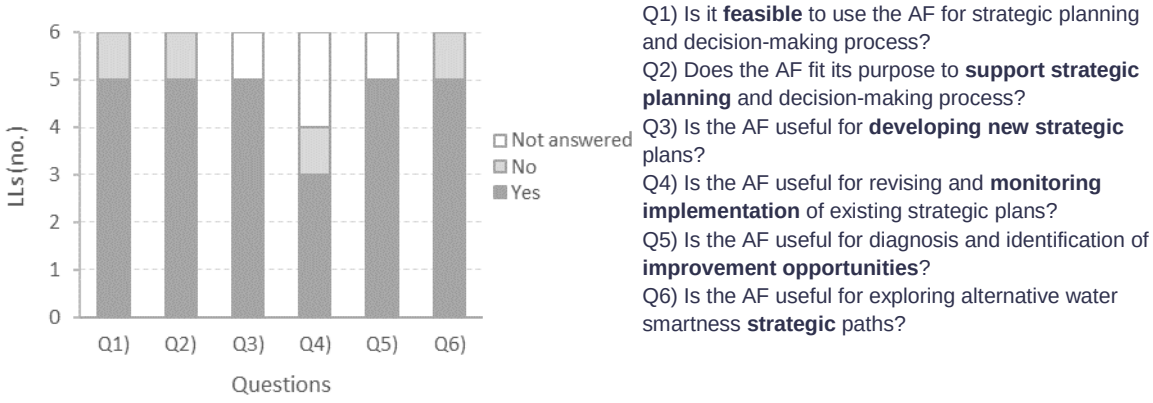

Figure 14: LL_i overall feedback on BWS AF as a strategic planning tool

Table 7: LL_i feedback on each question asked on BWS AF as a strategic planning tool.

Q	LL_i comments
Q1	• Some indicators need to be revised and removed (too many indicators), AF requires high efforts for making a company planning (lack of personnel resources) • Many ACs/Metrics deals with aspects (e.g., policy making, management of basin water resources...) which are out of reach for a medium size water utility. They can be used as context information, though (but it is not clear if the effort of retrieving the information is well worth it as it is impossible to define strategies to act on them) • Some metrics can be extremely demanding in terms of resources to retrieve the relevant information; some single ones could require an academic study on their own (interviews, surveys, interpretation) to be well determined • A water utility is not always perceived as a neutral actor by all the stakeholders. This conditions the chances to obtain the required information for several metrics • The use of the complete AF would surely require the collaboration of external help from experts with the right expertise/resources and perceived as neutral, such as universities, technical centres, etc.
Q2	• The AF is very detailed and requires much efforts for assessment, thus it might be not usable for "daily business" and fast decision making
Q3	-
Q4	• Strategic planning and the AF are currently not harmonized • This is not clear for us at the time
Q5	• It requires a lot of models, studies and forecasts to be made in advance • Probably, but it can depend on the breakdown into areas/demographics/individual water works/treatment plants etc. for some metrics.
Q6	• Singles strategies might not have significant effect on the indicators; detailed forecasts of single strategies required but not available • It gives you a good overview of areas to consider • Yes, especially for decision-makers
Q7	• Number of indicators needs to be reduced • Many ACs/Metrics deals with aspects (e.g. policy making, management of basin water resources...) which are out of scope for a medium size water utility. In those cases, we have tried to assess the relevance for planning at strategic level not only from our point of view, but also from a more general perspective (i.e. for the administration and policy makers) • In general, the user experience with the FAST (for future versions) should be improved. More flexibility should be implemented, since both for assigning the score in interview-based metrics and for metric feedback form often it difficult to assign the most fitting answer. The categories should be adapted to each metric. • As LL, we evaluated all metrics both from a general use perspective (framework per se, to be adopted from every organization) and also from a specific point of view, within our LL purposes (to answer to the strategic relevance of the metric). Often it is difficult to answer/to calculate some metrics, but we evaluated the metrics thinking of the framework as an instrument for the future. • It is now understandable why reference values have to be added by the user, but asking the feedback on them is not simple (how can we know if they are adequate to our context? It is not easy to assess until you have not calculated the metric with real values). Moreover, for the dashboard, to simplify the user experience, default reference values could be added automatically by the system, avoiding the user potential rough error in assigning them. It is also very important to have a general vision of the different answers, to see at a glance how the LL is performing from the governance point of view, technological, economic, etc. This would help in finding strategies to fill the gap to reach the water smartness. It could be useful to see at a glance how the user is performing on the different S.O.s. Another important aspect in aggregating scores lies in weighing the different metrics in relation to their importance for the LL. The score is expressed in % (based on the most ambitious value), but sometimes the most ambitious value is set by the organization, and this causes outputs that could be meaningless. • Simplify the initial choice of relevant metrics, by using also full descriptions and not abbreviations, otherwise the user is forced to see other documents or open other pages to assess their relevance in the assessment. • The normalization of some metrics is sometimes arbitrary, and this generates meaningless/abnormal scores. The contribution to the total water smartness score from these metrics should come not from the only % obtained, but from the "assigned colour" of the category, if reference values are applicable. • As additional comment, when the metric requires the filling in of an Excel or questionnaire, it would be helpful to have it linked in the dashboard and then when it's filled in the values automatically appear on the dashboard.

3.3 Overview of bilateral meetings feedback

Seven bilateral meetings, one with each LL_i, were carried out (18th – 26th of May) for supporting ongoing InAll Phases 1 and 2, particularly the definition of SO, AC and metrics. The meetings focused on the:

- clarification regarding the strategic agenda defined in MS12, and the strategic planning process regarding the organisation objectives, aligned with LL strategic agenda;
- ongoing sections of the strategic plan;
- water services and scope of the strategic plan;
- time horizon;
- establishment of objectives, assessment criteria, and metrics for the strategic plan or planning process.

During the meetings, the general feedback on the BWS AF was positive. The LL_i identified some metrics relevant for context characterisation rather than for assessment, and some questions regarding selection of social metrics. The need for metrics disaggregation was also identified and requested for a significant number of metrics, as well the possibilty to include their own metrics for some ACs.

4 Recommendations

4.1 Recommendations for refinement of the water-smartness framework

Overall, the LL_i consider the framework useful to support their strategic planning and decision-making process. There are, however, some suggestions for improving the AF. Based on the data presented in chapter 3, it is possible to develop the following recommendations for refinement of BWS AF from V_o to V_2 (V_1 are included in D6.2). The recommendations consider the analysis of the two types of feedback provided by six LL_i through the FAST tool, and during the InAll bilateral meetings. While the feedback covers all six LLs of the project, it had to be provided at an early stage of the planning process, which limits the extent of the feedback.

The main **specific recommendations** are to carry out a critical review and the necessary changes addressing:

- all the strategic objectives, regarding the **assessment criteria** and **metrics** where
  - aspects were identified as **unclear** or **needing revision**, recommendations are already implemented in D6.2 as BWS AF V_1 (Ugarelli *et al*., 2022b);
  - **lack of metrics** was identified, taking into account the suitability of the comments received by all LL_i, as there is no consensus;
  - harmonizing the **number of criteria** per strategic objective was referred to, i.e. to reduce the number of ACs in SO E;
  - there is no consensus on the **relevance of the metrics for the strategic level**; regarding this aspect, **one should assign the planning level of applicability** to each metric, e.g. strategic, tactical or operational, emphasising the possibility that some metrics may have different planning levels, scales (e.g. local, regional) or applicability purposes, i.e., the metric may be used for assessment and or to provide context information (as in the case of WEI+ metric);
  - there is no consensus on the **availability of data** for metrics calculation; it is important to emphasise that no metric was identified as having unavailable data simultaneously by all organisations, which signifies that the metrics' applicability is not compromised. **It is recommended to highlight that the assessment may contribute to identify data needs**;
  - there is no consensus on the **metrics reference values** for the assessment; it is important to emphasise that the reference values for some metrics may **depend on the context of the organization but should not be case-**

specific; the context-dependence should, whenever applicable, be clearly stated and some reference values may be further comprehensively derived based on national or international best practices;

- **strategic objectives A** and **E**, regarding the **adequacy of metrics** for criteria A.1 and E.1, considering the appropriateness of the comments received from the LL_i, as there is no consensus;
- the lessons learned regarding the interview process feedback (relevant for interview-based metrics, mainly associated with strategic objective E), as detailed in D6.2 (Ugarelli *et al*., 2022b);
- the need to **better explain the BWS AF role in the strategic planning process**, identifying whether the early feedback, i.e., at an early stage of the planning process, may explain the main reasons why one LL_i did not consider the framework useful to support strategic planning, revision and monitoring of existing strategic plans, or exploring alternatives in the strategic planning process; why two organisations did not answer on its usefulness for revising and monitoring of existing strategic plans and one LL_i did not answer on its usefulness for developing new strategic plans and identification of improvement opportunities;
- the **review** and update of the **need to better explain** or **to improve the BWS AF role** in the strategic planning process **at a later stage** of the InAll process;
- **keeping the flexibility** of BWS AF to allow its **application in different contexts and planning levels**. Take this into account in the metrics revision, particularly when deciding about **metrics elimination** – BWS AF includes a portfolio of metrics that, on the one hand, are not expected to be all applicable to all organisations due to different contexts, scopes and planning horizons, and, on the other hand, should consider the necessary and sufficient metrics, keeping parsimony and avoiding redundancy in the framework;
- **clarifying the purpose of the BWS AF as a reference framework** and not as the assessment system of the organization, i.e., BWS AF is a system that needs to be customized by the own organization, and eventually including some examples of customization;
- a means to obtain additional feedback at a phase of greater **consolidation** of the planning process, due to the lack of answers to certain questions. The required feedback will be carried out through bilateral meetings with the LL_i.

The **overall recommendations** are to carry out a critical review and the necessary changes to ensure:

- the BWS AF purpose is clearly described, as well as how to use it and how to interpret the results for strategic planning;

- regarding the purpose, BWS AF is well structured, complete, and parsimonious (considering the necessary and sufficient components) while flexible, applicable to diverse contexts, and the description of each component is clear;
- the alignment between strategic objectives, assessment criteria and metrics is assured;
- each strategic objective is adequately described by the assessment criteria considered;
- each assessment criterion is duly assessed through the metrics assigned;
- each metric has adequate reference values whose context-dependence is, whenever applicable, clearly stated;
- each metric has assigned its planning level of applicability, and whether it is applicable as an assessment metric or as context information, and the scale of application (e.g., local, regional);
- additional feedback may be useful in a phase of greater consolidation of the planning process, i.e, after a complete BWS AF application (to carry out a self-assessment, diagnosis, solutions' identification & assessment, and decision-making), which may provide a more validated opinion on BWS AF fit-for-purpose use. Regarding this last recommendation, InAll is the privileged means to get this information in a staged process, aligned with the phased-work planned to be developed.

4.2 Recommendations for transformation of the water-smartness framework into a dashboard-type software

Regarding the transformation of the water-smartness framework into a dashboard-type software, the feedback allowed to identify the following recommendations:

- Include the name of the metric in the selection panel (in addition to the code);
- Include the possibility of disaggregate the metrics as needed;
- Include the possibilty to define other metrics (not included in the AF);
- Automatically import to the dashboard the input values, e.g., from an excel file;
- Improve the normalization method of the metrics' results (included in FAST);
- Include the default reference values in the dashboard, that the LL_i may adjust based on validated best practices;
- For potential aggregation exercises, include the possibility to associate different weights for each metric in relation to their importance for the LL_i, an issue to be further analysed in T1.4;

- Allow to visualize the results from different points of view/dimensions: social, environmental, economic, technical and governance;
- Identify the input variables needed; for each input variables, identify the selected metrics it is used for, ensure that each variable is inputed only once, regardless of the number of metrics it is used for;
- Allow to visualize the results for the different strategic objectives.

Additionally, for supporting the planning process, the dashboard-type software should allow to:

- Visualize the strategic assessment on a temporal basis (metric computation for different years);
- Visualize the judgement of each metric based on the reference values defined for good, fair, and poor performance;
- Metric normalization based on the judgement defined;
- The possibility to establish targets for strategic planning horizon (t_N) and intermediate targets for the evaluation of system performance – an essential basis for establishing the diagnosis, prioritizing intervention solutions, and monitoring the results;
- Prospective evaluation for different scenarios;
- Compare different alternatives.

5 Final remarks

In the scope of *WP1 – Co-create & demonstrate systemic innovation in 6 LLs*, the BWS InAll was set up across the six LLs of the project, Alicante, Bodø, Flanders, Lisbon, East Frisia and Venice, being a key co-production instrument of BWS project. InAll is tailored for the seven BWS LL primary problem-owners from the six LLs to internalise and learn by doing how to use the BWS objective-oriented water smartness assessment framework as a key instrument for strategic planning. The seven LL problem-owners represent diverse missions, characteristics, locations, contexts, dimensions, and challenges.

InAll provides, on the one hand, a chance for the LL problem-owners to learn by doing and share their experiences on using BWS AF and, on the other hand, a privileged opportunity for the BWS AF developers to receive their feedbacks on the framework.

Two types of feedback were obtained at an early stage of the planning process. Specific feedback for each strategic objective, assessment criteria, and metric of the framework aiming at assessing particular aspects, and a generic feedback about the framework aiming at assessing whether it fits the purpose of strategic planning and receiving suggestions regarding its use through a dashboard-type software.

From the feedback analysis carried out, relevant first recommendations were produced to support both the refinement of BWS AF and the development of the corresponding dashboard. Concerning the first one, they are mainly related with a critical review of the framework to ensure a clear description of its purpose of interpretation of the results for strategic planning; that it has the recommended characteristics for a structured assessment framework; it may be applicable at diverse scales and to consider additional feedback from InAll in a phase of greater consolidation of the planning process, which may provide a more validated opinion on BWS AF fit-for-purpose use. Regarding the transformation of the framework into a dashboard-type software, recommendations are related to the data input, new metrics definition, metrics aggregation, normalization, judgment, and visualization.

The results presented were obtained in close collaboration with WP6 and with contributions from T3.9 and will support the developments of the final version of the BWS AF in T6.3.

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7 Online references

https://b-watersmart.eu/living-labs/

Appendix – Feedback questions

- **Generic feedback**
  - Q1) Is it feasible to use the AF for strategic planning and decision-making process? If not, explain why.
  - Q2) Does the AF fit its purpose to support strategic planning and decision – making process? If not, explain why.
  - Q3) Is the AF useful for developing new strategic plans? If not, explain why.
  - Q4) Is the AF useful for revising and monitoring implementation of existing strategic plans? If not, explain why.
  - Q5) Is the AF useful for diagnosis and identification of improvement opportunities? If not, explain why.
  - Q6) Is the AF useful for exploring alternative water smartness strategic paths? If not, explain why.
  - Q7) Is there any other feedback/comment you would like to provide for the AF?
- **Specific feedback on the objectives**
  - Q1) After having a quick look at the AC, please indicate if there is any AC which is not clear. If yes, mention which these points are.
  - Q2) Please indicate if there is any AC which needs to be revised. If yes, mention which AC(s) must be revised along with the suggested revision.
  - Q3) Considering the complete list of ACs proposed for this SO, do you consider all the points of view that allow for the assessment of the objectives are covered? If not, please mention which they are and give a brief description.
- **Specific feedback on the assessment criteria**
  - Q2) Are there other (missing) related metrics that need to be included in the AC? If yes, what is your suggested feedback?
  - Q3) Are there metrics which are misplaced (they are placed to the wrong AC)? If yes, please specify which is the AC they fit better. If yes, please specify.
- **Specific feedback on the metrics**
  - Q4) State if this metric is relevant for planning at the strategic level. If yes, state if it is relevant for planning at tactical or operational level.
  - Q5) State if all necessary data are available for evaluating the metric. If not available, please indicate which are the missing data and if there is

any possible way of acquiring them.

- Q10) Are the reference values adequate in your context? If not, explain why.

B-WaterSmart

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