Final portfolio of training actions

Deliverable 1.6

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Final portfolio of training actions

D1.6: Final portfolio of training actions
Deliverable 1.6

Summary
Training is an essential element in the systemic innovation chain of B-WaterSmart, anchored in capacity building while corresponding to the stakeholders' needs and expectations. The B-WaterSmart training portfolio stands out with its threefold objectives: dedicated training actions to ensure capacity building on the water-smart solutions and products and maximisation of their value; promotion of transfer potential and ensuring that the products developed meet stakeholder needs and expectations; and contribution to the B-WaterSmart dissemination and communication strategy and knowledge portal to ensure knowledge accessibility and uptake. Moreover, the portfolio's adaptability allows the integration of additional training actions to add value in supporting B-WaterSmart purposes, benefits, and knowledge, both for those directly involved in the project and for the broader public. This deliverable provides a comprehensive presentation of the final portfolio of training actions resulting from the B-WaterSmart innovation activities. It is based on the training actions delivered and assessed during the project. As an introduction, chapter 1 presents the objectives, scope and role of the training in B-WaterSmart and the principles of the training portfolio. Chapters 2 and 3 present the portfolio planning and structure, namely the underlying concept for BWS training actions, the 3-level approach, the training need and schedule, the training workflow, the main themes included in the final portfolio and the portfolio contents. Chapter 4 presents the assessment of B-WaterSmart training activities and their contribution to BWS key performance indicators. Finally, Annex I thoroughly present the final portfolio on L1, L2, and L3 training actions, and Annex 2 outlines general guidance for trainers.

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D1.6	WP1
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Authors contributions

- LNEC: definition of the approach, development of contents, management of project training activities, original writing, editing, and production of the final document.
- WE: original writing of annexe 2.

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List of acronyms and abbreviations

BWS	B-WaterSmart (H2020 funded project)
CoP	Community of Practice
Dx.y	Deliverable y of Work Package x
GA	Grant Agreement
InAll	Innovation Alliance
L1	Level 1 actions
L2	Level 2 actions
L3	Level 3 actions
LL	Living Labs
M	Month
MS	Milestone
T	Task
WP	Work Package

Executive summary

The B-WaterSmart project aims to contribute to water-smart societies and economies by adopting a large-scale systemic approach to select, connect, and demonstrate tailored suites of innovative technology, management, and interoperable smart data solutions for multiple users and sectors. The systemic innovation approach builds on effective collaboration, communication, and knowledge exchange involving six European coastal cities and regions acting as Living Labs (LL) - Alicante, Bodø, Flanders, Lisbon, East Frisia and Venice - and supported by Communities of Practice (CoP), an Innovation Alliance (InAll) and by partners capacity building through training activities.

One of the main aims of WP1 - Co-create & demonstrate systemic innovation in six Living Labs is to ensure that the six B-WaterSmart LL are capacitated to use the project products relevant to their current or foreseen specific context and to optimise the value of the products, contributing to maximise the project impact during and beyond the duration of the project. Training is an essential element in the systemic innovation chain of B-WaterSmart, anchored in capacity building while corresponding to the stakeholders' needs and expectations. The B-WaterSmart training portfolio serves a crucial role in achieving these objectives. It stands out with its threefold objectives: dedicated training actions to ensure capacity building on the water-smart solutions and products and maximisation of their value; promotion of transfer potential and ensuring that the products developed meet stakeholder needs and expectations; and contribution to the B-WaterSmart dissemination and communication strategy and knowledge portal to ensure knowledge accessibility and uptake. Moreover, the portfolio's adaptability allows the integration of additional training actions to add value in supporting B-WaterSmart purposes, benefits, and knowledge, both for those directly involved in the project and for the broader public.

This deliverable provides the final B-WaterSmart training portfolio planning, content and structure, their objectives and scope, the role of training in capacity building and the principles orienting B-WaterSmart training activities. The last chapter presents the assessment of B-WaterSmart training activities and related key performance indicators (KPI). Annex I provide thorough portfolio information on L1, L2, and L3 training actions. Annex 2 outlines general guidance for trainers.

1 Introduction

1.1 Objectives and scope

The B-WaterSmart project aims to contribute to water-smart societies and economies by using innovative technology, management, and smart data solutions. A systemic innovation approach builds on effective collaboration, communication and knowledge exchange involving six European coastal cities and regions acting as Living Labs (LL) - Alicante, Bodø, Flanders, Lisbon, East Frisia, and Venice - supported by Communities of Practice (CoP) and an Innovation Alliance (InAll). These were instrumental in ensuring solution transferability and replicability and analysing barriers and drivers to innovation growth and market outreach. InAll implementation aims at peer-to-peer capacity building by testing and refining the water smartness assessment framework developed by B-WaterSmart.

A core aim of WP1 - Co-create & demonstrate systemic innovation in six Living Labs is to ensure the training within the six B-WaterSmart LL and other target groups. The training program for the six B-WaterSmart Living Labs teams is of utmost importance, as it equips them with the necessary use of the project's products in their specific contexts while maximising the value of the products. We used webinars with partners and other Living Lab stakeholders as the preferred training method, with additional face-to-face training when necessary. The training covered topics from WP2 to WP6.

Training is an essential element in the B-WaterSmart systemic innovation chain, designed to correspond to the stakeholders' needs and expectations (Rebelo et al., 2021). The collaborative design of the training content, planned in close cooperation with the dissemination and exploitation activities in the project, ensures that all stakeholders are involved in the process. This approach contributes to extending the impact of the project work and results during and beyond the project among B-WaterSmart partners, other LL stakeholders, and potential followers.

The BWS training portfolio objectives are threefold:

- Develop dedicated training actions to ensure capacity building on the water-smart solutions and products and increase their value.
- Ensure that our products not only meet but exceed stakeholders' needs and expectations, thereby promoting their transfer potential.
- Contribute to the B-WaterSmart dissemination and communication strategy and knowledge portal to ensure widespread knowledge accessibility and uptake outside the project team as part of the knowledge creation and sharing, training and education project aims.

The training portfolio includes a coordinated set of core training actions as initially planned and supplementary training actions, adding further value in expanding BWS objectives, benefits, and knowledge. The benefits are to those directly involved in the project and a wider audience.

1.2 Role of training in capacity building in water smartness

The training portfolio comprises a collection of training actions to respond to the set objectives tangibly. As the project progressed, the training activities were delivered in sync with the project's developments, gradually building up to the final portfolio. This portfolio, now a part of the project legacy in the project portal, includes validated training activities that ensure capacity building on water-smart solutions and products.

1.3 Principles of the B-WaterSmart training portfolio

Ground principles leading the portfolio developments include:

- Respond to training needs and expected outcomes, as expressed by partners and stakeholders.
- Incorporate project training actions in a shared harmonised plan aligned with project dissemination and exploitation activities.
- Consider target audience profiles, namely partners, LL stakeholders, and interested parties not involved in the project.
- Contributing to the regularly curated knowledge portal during and after project conclusion is a key part of sharing project insights. This contributes to the continuous learning and development of the project community.
- Provide the training and corresponding materials in English, as a common language for European and non-European countries, complemented by translated versions to foster project impact when found adequate.

2 B-WaterSmart training portfolio planning and structure

2.1 Underlying concept

Water smartness is a concept that incorporates different approaches, technologies, and tools, which are naturally not limited to those explored in this project. The potential for expanding the portfolio derived from this project in multiple ways is undoubtedly possible, highlighting the flexibility and adaptability of the concept. The wide range of relevant subjects is embedded in the chosen definition of water smartness proposed by Damman *et al.* (2023):

"Societies are water-smart when they generate societal well-being via sustainable management of water resources. In water-smart societies, well-informed citizens and actors across sectors engage in continuous co-learning and innovation to develop an efficient, effective, equitable and safe circular use of water and the related resources. This is achieved by adopting a long-term perspective to ensure water for all relevant uses, safeguard ecosystems and their services to society, boost value creation around water, while anticipating change towards resilient infrastructure."

These authors emphasise the importance of accounting for perspectives and issues, namely:

- focus on societal well-being and long-term sustainability;
- conserving broader ecosystems and their services to society;
- adaptation of existing infrastructure;
- multi-sector (water-energy-food) interactions;
- nurture experimentation, variation and flexibility.

The core concept of this portfolio is the role of training in promoting effective water smartness. This is achieved by linking development, testing, training, and knowledge dissemination processes. It is important to note that training is not a standalone process, but rather it is intricately linked to other areas such as co-creation and demonstration of systemic innovation (WP1), water-smart technologies, tools and data (WP2, WP3 and WP6), circular economy and value chains (WP4) and society, governance and policy (WP5).

B-WaterSmart key innovation outcomes provided an overview of topics considered in the project and reflected in the technologies and tools of the project (annex1).

Development during the project presented challenges, particularly the multitude of tasks teams had to complete before delivering training. To address the unavoidable delays in project-planned L1 training, the introduction of the L2 and L3 training levels was proposed. These levels were deemed crucial in consolidating complementary knowledge and competencies, underscoring their significance in the project and the need for continuous teamwork. Despite the project calendar constraints, the three-level training structure was crucially suitable for a more permanent training structure to promote water smartness.

The training portfolio is not conceived as a course with a fixed structure; it should be an adaptable and continuously improved portfolio, supported by an on-line structure and complemented by face-to-face sessions. This is made possible through its connection to the project portal, which plays a crucial role in supporting the online structure and complementing the face-to-face sessions.

2.2 The 3-level approach

The adopted approach to organise the BWS training portfolio follows the needs identified in the B-WaterSmart project concept and was extended during project implementation to integrate additional initiatives contributing to the project objectives. To go beyond the initial structure, three levels of training actions were defined as follows:

Level 1 (L1): short courses on BWS products and solutions (e.g., guidelines, governance, policies, technologies) as included in the GA as the training portfolio backbone.

Level 2 (L2): state-of-the-art and brainstorming sessions on topics relevant to the core objectives and developments of BWS (e.g., brine disposal aligned with issues in WP2, performance assessment approaches as part of WP6 developments). These sessions complement L1 short courses.

Level 3 (L3): thematic webinars outside the work of BWS but on related topics (e.g., promoted by the LL owners).

An example of the L2 initiatives is the first test training action on “Guidance on building a BWS assessment system” as part of the development of the water smartness assessment framework within B-WaterSmart. The learning objectives for participants included to understand and select adequate assessment criteria, metrics, reference values and targets; to interpret the results of the application of an assessment system; to deal with accuracy and reliability issues.

As an example of the L3 initiatives, Lisbon Living Lab played a pivotal role in the first year of the project by organising a bi-monthly seminar to support the partners’ work not only for BWS people but also beyond. These seminars aimed at facilitating the integration of BWS into the partners’ long-term strategy and activities and allow partners to become more familiar with each other’s work, helping to foster durable synergies.

The final training portfolio includes the validated versions of L1 actions and selected L2 and L3 actions.

2.3 Assessing training needs and schedule

The training needs for B-WaterSmart solutions and products, identified in association with developments under WP2 (Water-smart technologies and concepts) and WP3 (Water-smart applications and data), are presented in the project GA and included as L1 actions. The assessment of additional training needs was carried out with a thorough survey, ensuring that all aspects were considered, by the mentioned WP teams and by WP4 (Circular economy value chains) and WP5 (Society, governance, policy). The list of technology and data application products under L1 actions is presented. The annex includes a draft content of the L1 short courses (level 1) and the trainee minimum background requirement for each course, a testament to our comprehensive approach.

The planning of training at L2 (state-of-the-art and brainstorming sessions) and L3 (thematic webinars) levels was designed with flexibility in mind. These levels were defined, using periodic surveys to partners, to ensure proper planning and dissemination. While biannual plans were the basis for these actions it was possible to accommodate actions planned with shorter notice, demonstrating the working team adaptability.

For level 1 training actions, a first schedule was meticulously based on the project timeline as presented in deliverable D1.7 (Schmuck and Wencki, 2021). Flexibility to accommodate specific product development phases and avoiding an undesirable concentration of training actions in the

schedule was limited by the project planning in the development of products and tools. Two rounds of training were set. The first round was for those BWS products expected to be available earlier, typically after the first quarter of the project's second year and the start of the third year (2022). The second round was mainly for products with longer development and pilot implementation periods. Given the number of products, this division in two rounds allows was intended to avoid the concentration of short courses by the project end. Replication of training was also planned but only one was delivered twice (#20).

The schedule was flexible for level 2 and 3 training actions, allowing for shorter planning time for organisers but enough time for those who want to benefit from a plan set ahead in time, typically up to six months, and dissemination on the BWS website and other project dissemination resources.

This timeline was aligned with other project activities (e.g., activities for exploitation and route to the market), enabling the use of produced training materials. The consistency of the training timeline with other activities planned under BWS communication, exploitation and replication activities was verified regularly during the project development.

Planning the BWS training actions involved collaborating closely with partners responsible or willing to organise a short course, state-of-the-art presentations, brainstorming sessions, or thematic webinars. Together with the T1.3 and WP7 teams, main workflows, guidance, and quality control (annex 2) were progressively put in place to improve and maximise the benefits of the training actions during the project implementation and beyond.

2.4 Training action workflow

Figure 1 presents the workflow involving the T1.3 team and the action organisers for each action, Figure 1. Nextcloud® was used as repository for the required forms and resulting materials from each training action. These materials were used to develop the training contents in the project portal (WP7).

The T1.3 team tasks included the following:

- develop and coordinate the training schedule and portfolio building;
- decide on the action dates with organisers considering the set action schedule;
- collect the relevant information for each training action;
- develop and make available documentation to support the planning of training actions;
- gather the contributions of project partners to the training portfolio;
- provide guidance on quality control to the action organisers;
- develop a L1 presentation template including general content about the project and a typical short course structure with the collaboration of course organisers;
- develop a guidance document for trainers.

The training action organizers tasks included the following:

- register the action in BWS portfolio using the action data template available in the Nextcloud® platform;

- define the action dates together with the T1.3 team, taking into account the global training action schedule and action priorities (level 1 actions have higher priority);
- send action information to the WP7 team for dissemination and materials for asynchronous training, as applicable;
- organise the action and prepare all the support materials;
- fill the action report using the action report template available in the Nextcloud® and return it to the T1.3 team;
- supply the link for action evaluation to the participants;
- collaborate with the T1.3 team in preparing presentation templates, guidance documents and the final BWS training portfolio.

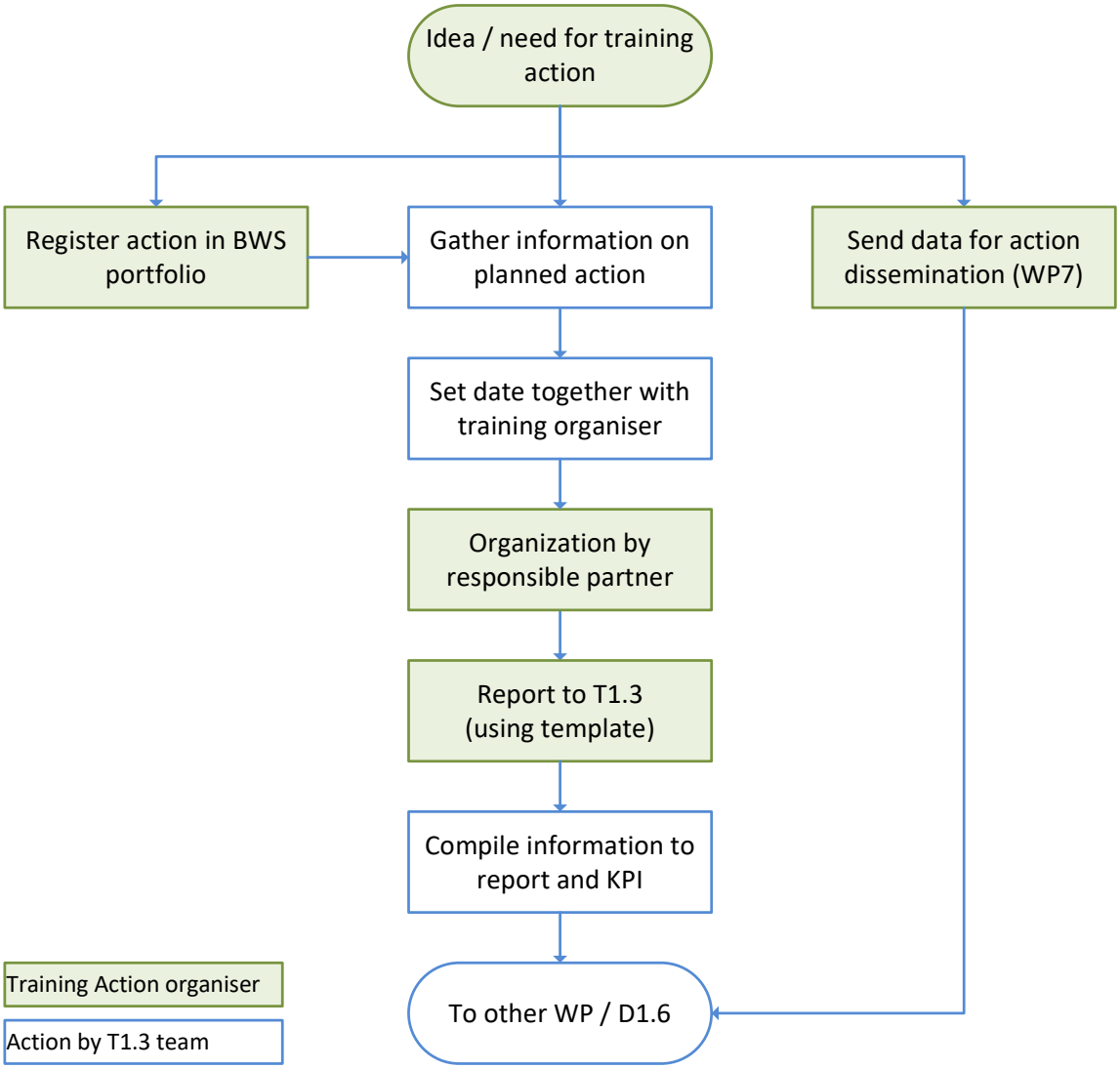

Figure 1: B-WaterSmart training actions workflow

Guidelines for organisers and trainers were developed to improve the quality assurance of training actions (annex 2).

2.5 Main themes included

The B-WaterSmart project Water Smartness Training Portfolio responds to six main themes, as in Table 1 (Cardoso *et al.*, 2024), despite the inevitable overlaps as indicated by the training action teams.

Table 1: BWS technology products and data application products distribution in six main themes

Type of resource /circularity	Living Labs addressing the resource in B-WaterSmart		B-WaterSmart product or tool # related to the theme (annex 2)
Digitalisation & IoT	All LLs		Digital tools
Drinking water	Bodø:	Urban water losses management	#14, #15, #29, #30
	East Frisia:	Regional water demand-supply matching tool, Short-term demand forecasting tool, UWOT tool	#22, #23, #28
Energy	Alicante:	Biogas production and microturbines for energy self-sufficiency	#10, #13
	Bodø:	Small-scale biogas production	#12*
	Lisbon:	W-E-P balance, climate readiness certification	#17, #24, #25, #33
	Venice:	Biogas production and energy saving	#4, #11
Nutrients, biosolids and others	Alicante:	Ammonia recovery, biosolids beneficial use, Cl2 production	#7, #8, #9
	Venice:	Ammonia recovery, Biosolids beneficial use	#11, #19
Reclaimed water	Alicante:	Reclaimed water production for urban uses and industry	#18
	East Frisia:	Water reuse in dairy industry through combined treatment of vapour condensate	#6
	Flanders:	Regional analysis, agricultural reuse Direct potable reuse	#2, #3, #5, #22, #26, #31
	Lisbon:	Reclaimed water for non-potable urban uses Direct potable reuse for beer production	#1, #17, #20, #24, #25, #27
	Venice:	Reclaimed water for industrial and agricultural reuse	#4, #16, #32
Stormwater	Flanders:	Agricultural use (Proef Station)	#21, #22, #26
Cross-cutting	All LLs:	Water-smartness assessment framework and tool	#34

* This training action was not delivered due to the withdrawal of a partner from the project consortium.

These themes served as method of concept testing and validation, but many others could be included and, therefore, the project concept and the portfolio can be expanded to easily accommodate them.

A survey was conducted to get the direct responses from the training action leaders in terms of how much the tool contributed for each theme using a three-level scale: high contribution, moderate contribution, low or no contribution (Figure 2). Despite the unavoidable limitations of this survey, many tools are considered to provide a high contribution to digitalisation and IoT (69%), to drinking water (54%), reclaimed water (57%), stormwater use (37%) and energy (27%), which are clearly important themes of concern.

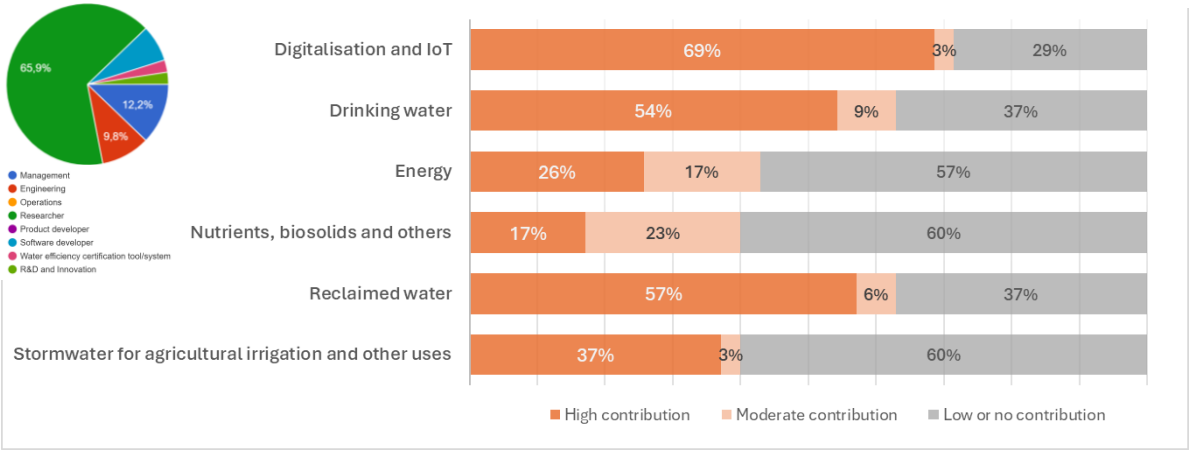

Figure 2: Contribution of tools for each theme (% of tools); pie chart respondents' main function

Other subject areas to which the project technologies and tools contribute, and opportunities for development, were suggested by respondents: carbon footprint, infrastructure management and integrity, different water uses (potable and non-potable), governance models, water-related cross-cutting aspects of policy and regulation, inclusion of other types of water sources including stormwater management, management and decision support, planning, risk management, water smart cities. Even though some of these are at least partly addressed in the project, there are opportunities to expand this approach.

3 Portfolio contents

The B-WaterSmart training portfolio's purpose is to contribute to ensuring capacity building on the water-smart solutions and products developed during the project, optimising their value while promoting transfer potential and ensuring that products correspond to the stakeholders' needs and expectations. The replication potential of the portfolio is anchored in the project portal and intends to promote continual active learning, which is key to ensuring the dissemination and application of the *water-smartness* concept. The training portfolio is not limited to project products and solutions.

The B-WaterSmart approach integrates three levels of training actions aim at cover related subjects relevant to capacity building for increasing water-smartness of those directly involved in the project and a wider audience. Thus, through the project portal, it can contribute to knowledge accessibility and uptake and reach actors outside the consortium and the public as part of the knowledge creation and sharing aims of the project.

Active learning is centred on the learner and aims to strengthen personal involvement and ownership of the learning process. It requires interaction between the trainers and the participants and amongst participants. B-WaterSmart embraces this approach when delivering training actions.

The portfolio core topics include those in Figure 3, resulting from the GA structure. The training portfolio includes the coordinated set of core training actions as initially planned and supplementary training actions (Table 4 and Table 5, respectively, in annex 1), adding further value in expanding BWS objectives, benefits, and knowledge.

The core (L1) and the complementary (L2 and L3) training actions delivered are presented in Figure 4 and in Figure 5, respectively.

The core versus complementary training actions emphasized the value of having different types of sessions, some more broad, generic but informative, others more technical, and finally, specific ones for capacity building in terms of using a tool or technology where face-to-face and hands-on or in-situ work are essential to achieving the target capacity building level.

The final project portfolio is the result of concept testing and validation, but many other topics and contents can be included, expanding the proposed project concept and portfolio to easily accommodate them. Out from those proposed in GA (L1), all but only one action (#12) have been successfully delivered. Unfortunately, the responsible partner for this action left the project consortium.

In annex 1 more information about the training events including the detailed contents of training actions (L1, L2 and L3) and minimum requirements for trainees (for L1) for each training action proposed.

The individual training actions, when combined, can form a short course tailored to the specific objectives of the training. Throughout the project, these short courses were organised around common subjects, a range of topics of interest to specific audiences (e.g., a Living Lab), or delivered individually. The B-WaterSmart topics, which represent a significant advancement in the state of the art of technologies, tools and best practices, are of particular interest to academia. These topics have been tested in existing situations with the involvement of responsible agents or users in six cities.

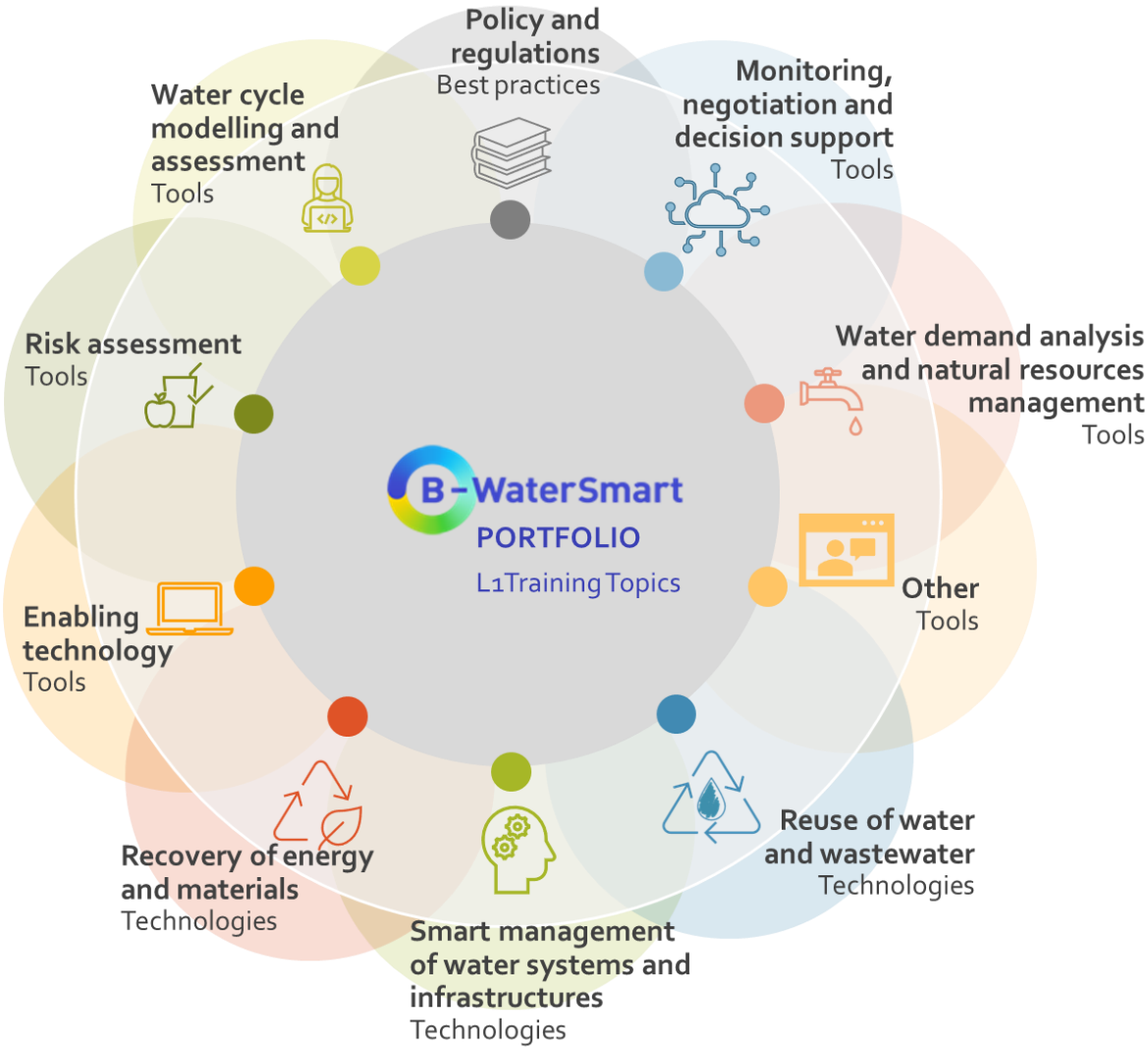

Figure 3: Core topics of the B-WaterSmart training portfolio

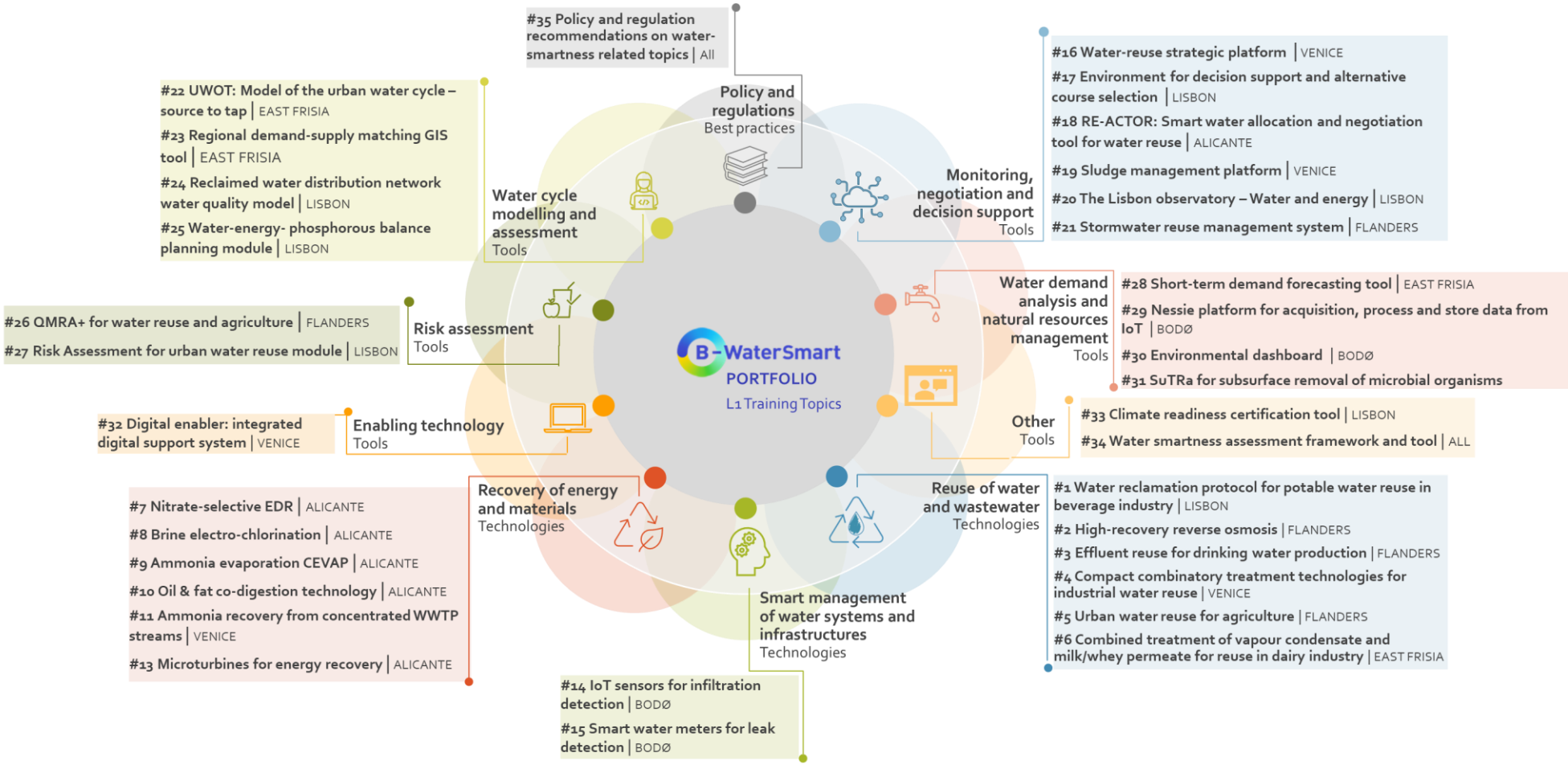

Figure 4: B-WaterSmart portfolio contents – Level 1 – core contents for capacity building

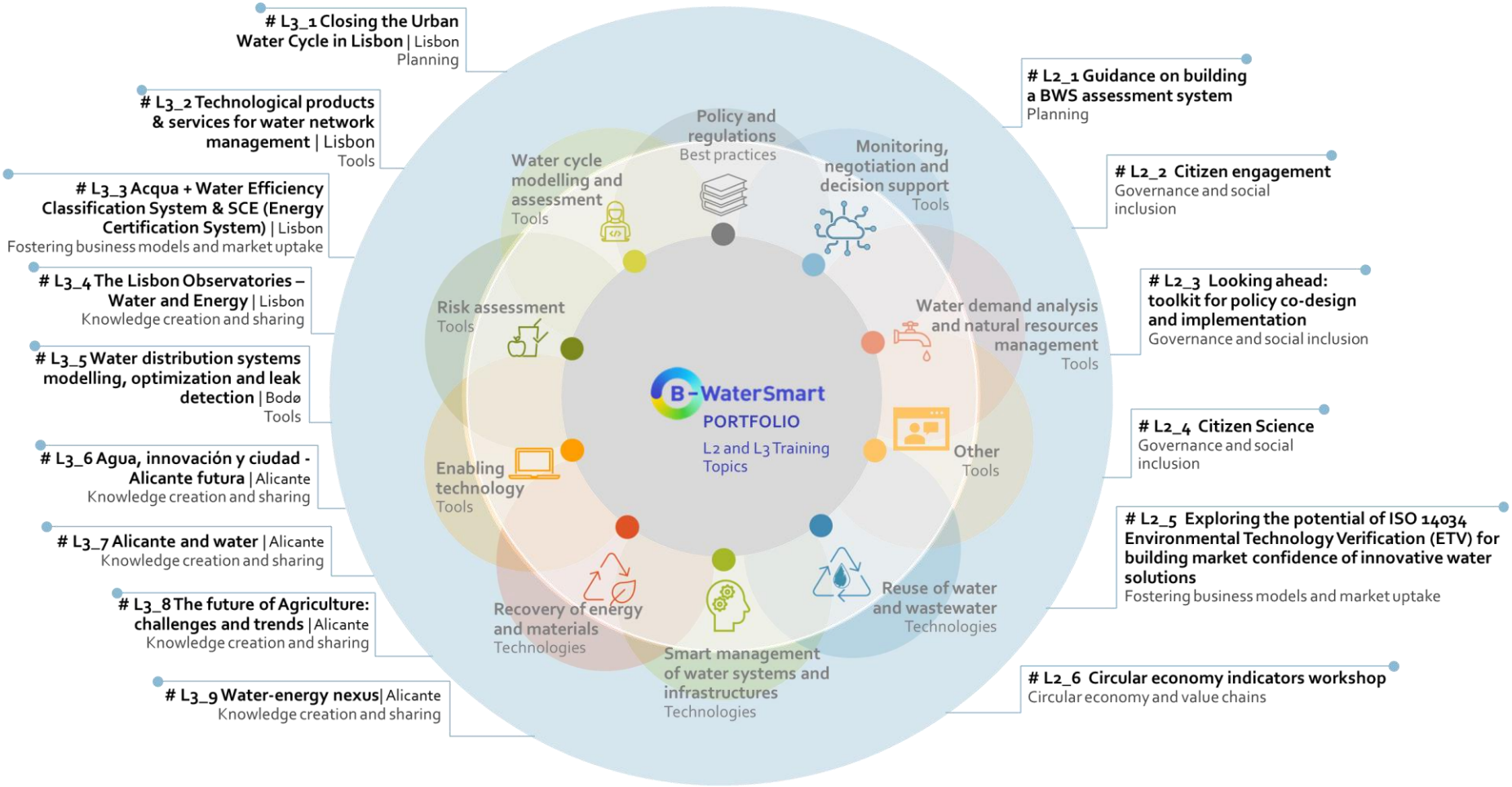

Figure 5: B-WaterSmart portfolio contents – Level 2 and 3 – complementary contents for capacity building

4 Assessment of B-WaterSmart training activities and key performance indicators (KPI)

4.1 Balance of training actions on B-WaterSmart products

The balance of the training activities during the project was quite positive. The first training action (L3) was on 01/10/2020, and the last was on 25/07/2024. The total number of participants in the training actions was 577 persons, which provides a good indication of the impact of these actions during the project.

The distribution of the training actions during the project (Figure 6) shows a clear trend towards the end of the project, especially considering that the years 2020 and 2024 were shorter in terms of project duration, with only 4 and 8 months, respectively.

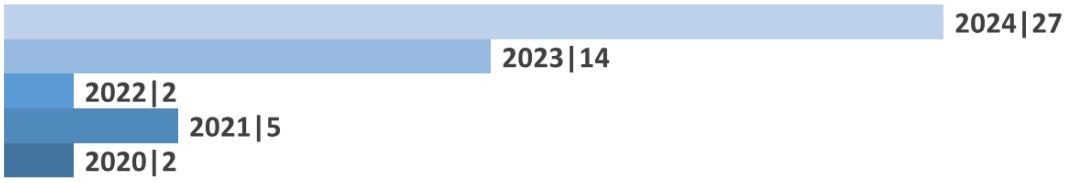

Figure 6: Yearly distribution of training actions delivery (year | number of actions)

The number of actions surpassed the initial proposal by 43%: 35 L1, 6 L2 and 9 L3 actions. Partners involved in some LL were very proactive and contributed to the L3 actions from early in the project development. The information in Table 2 illustrates the distribution of training actions regarding tasks or associated Livings Labs. The teams delivered some actions more than once for different purposes (e.g., introduction, detailed presentation, hands-on).In terms of participants, apart from face-to-face training, most L3 training actions were open to all BWS members, project stakeholders and some to a broader public (e.g., CIRSEAU).

Table 2: B-WaterSmart training activities delivery location

Scope or Living lab	Training event type		
	L1+L2+L3	L1	L2+L3
T2.1|3.2|3.9/Alicante	12	7	5
T2.2|3.3|3.9/Bodo	6	5	1
T2.3|3.4|3.9/East Frisia	6	5	1
T2.4|3.5|3.9/Flanders	8	8	0
T2.5|3.6|3.9/Lisbon	18	9	8
T2.6|3.7|3.9/Venice	6	6	0

For the available information, the average number of participants was 16.1 people per session, with a

minimum of 4 and a maximum of 47. Detailed information is in the annex Table 41, and Table 5, respectively, for L1 and L2+L3 training actions.

4.2 Training actions evaluation and KPI

Quality assurance guidelines were developed to assist trainers, and an evaluation procedure has been implemented since November 2022 (cf. annex 2). The evaluation was planned to occur after each action, using an assessment template developed by the T1.3 team (Google Forms survey), to be returned by participants anonymously and voluntarily (annex 1). The report form is to be sent to the T1.3 team after the training. The results were provided to the training action leaders, allowing for the identification of opportunities for improvement. The number of responses from participants was low (between 1 and 16 responses and an average of 5.3 response rate per action).

This evaluation provided the values to calculate the project performance indicator (KPI_2: Systemic innovation through capacity building and training) KPI_2.1, measured by the percentage of webinars receiving at least a '4 in 5' average rate by the participants. The results for the training actions delivered show an average result of '94% of 4 in 5' rates, significantly surpassing the 80% targeted in the GA by M36. The results for M48 were of 89%, slightly lower but still clearly above the target, but demonstrating the effectiveness of B-WaterSmart training actions.

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Annex 1 | Portfolio information

List of BWS technology products and data application products as in GA

Table 3: BWS technology products and data application products as in GA

#	Technology / tool / demonstration activity	Task
	Technologies | Reuse of water and wastewater	
1	**Water reclamation protocol for potable water reuse in beverage industry**: showcase safe potable water reuse by food & beverage industry compatible with certification by health and environmental authorities, increase industry resilience to climate change by introducing a climate independent water source (Lisbon).	2.4.1
2	**High-recovery reverse osmosis**: integration in existing drinking water treatment train. Showcase high recovery reverse osmosis as a solution to increase robust water production by decreasing the raw water quality demands for intake in drinking water production, hence increasing regional system resilience. [Description differs from the GA. The version presented here is in line with the one in the request for the first amendment of the GA, approval pending]	2.3.1
3	**Effluent reuse for drinking water production**: technology demonstration of effluent reuse for drinking water, introducing alternative drinking water resources to increase regional resiliency. Implementation of quality (nutrients and emerging contaminants) and safety (pathogens removal) controls (Flanders).	2.3.2
4	**Compact combinatory treatment technologies for industrial water reuse**: demonstration of the possibility of extending water reuse at industrial level by applying a chosen multiple treatment sequence (including ultrafiltration, nanofiltration and reverse osmosis) (Venice).	2.6.1
5	**Urban water reuse for agriculture**: technology demonstration of urban stormwater reuse for agriculture, introducing alternative water resources for irrigation. Implementation of quality (nutrients and emerging contaminants) and safety (removal of pathogens) controls (Flanders).	2.3.2
6	**Combined treatment of vapour condensate and milk/whey permeate for reuse in dairy industry**: higher stability and flexibility of the process, more efficient and competitive, exportable into markets with high barriers for approval by authorities. Enables quick shift between different qualities fit for different purposes. Better control of hygiene status of treated water through smart monitoring. Lower barrier for approval by health/food authorities (East Frisia).	2.5.1
	Technologies | Recovery of energy and materials from water and wastewater	
7	**Nitrate-selective EDR**: separate nitrates from wastewater effluents, manage separately for: nutrient recovery, water reuse in fertigation. Recovery of nutrients in WWTP effluents for irrigation instead of spending energy in eliminating nutrients (Alicante).	2.1.3
8	**Brine electro-chlorination**: use of brines from RO in tertiary treatment of WWTP, generate hypochlorite for effluent disinfection and membrane cleaning. Lowering dependence in hypochlorite purchased externally, lowering of salinity in brines to be disposed of (Alicante).	2.1.4
9	**Ammonia evaporation CEVAP**: evaporation and recovery of liquid ammonia from sludge returns. Recovery of nutrients from the sludge to avoid disposal of ammonia-rich sludges. Use of liquid ammonia in DENOX industry (Alicante).	2.1.5
L0	**Oil & fat co-digestion technology**: use of waste from primary treatment to promote co-digestion and increase biomethane generation. Lowering disposal of waste from the WWTP (Alicante).	2.1.1
L1	**Ammonia recovery from concentrated WWTP streams**: pilot phase, optimise anaerobic digestion of mixtures of sludge and liquid special waste, enhance ammonia concentrations before stripping. Demonstration of nutrients recovery by integration at WWTP (Venice).	2.6.2
L3	**Microturbines for energy recovery**: use of microturbines to recover energy from the WWTP effluent for internal reuse of the generated energy (Alicante).	2.1.2

Table 4: BWS technology products and data application products as in GA (continued)

#	Technology / tool / demonstration activity	Task
	Technologies | Smart management of water systems and infrastructure	
14	**IoT sensors for infiltration detection**: to improve information available for detection of I/I sources in wastewater networks, improved signal transmission and energy solutions (Bodø).	2.1
15	**Smart water meters for leak detection**: demonstration of leak detection and water quality sensors in an integrated solution with microturbine capabilities to generate enough power to transmit auxiliary data from household smart water meters. This gives significantly improved and more distributed information available for leak detection of water supply networks (Bodø).	2.2.1
	Tools | Monitoring, negotiation, and decision support tools	
16	**Water reuse strategic platform**: FIWARE–based Platform based on ENG's Digital Enabler to support standardized/ transferable evaluations and communication among stakeholders for the assessment of economical/ environmentally sustainable water reuse opportunities. Will provide a shared evaluation model to support objective, traced and updatable decisions (Venice).	3.1,
17	**Environment for decision support and selection of alternative courses of action**: city and sector prioritization and decision-making environment, based on sets of key analytics, including water, energy, and nutrient balances; performance, risk, and cost analytics. Expressed numerically and graphically on a georeferenced 2D/3D cityscape environment. (Lisbon).	3.5
18	**RE-ACTOR: Smart water allocation and negotiation tool for water reuse**: real time water quality and risk monitoring to ensure acceptability of the different water end-users and to visualize the economic and environmental benefits of using the water. Engagement of stakeholders in decision-making through simulation of potential water reuse scenarios (Alicante).	3.2
19	**Sludge management platform**: based on ENG's Digital Enabler, development of FIWARE–based Platform to support the identification of the optimum sewer sludge valorisation system, to foster energy and resource reuse/recovery. Platform will allow evaluation and ranking of treatment options, considering geographical, environmental, economic, social, and political barriers (Venice).	3.7
20	**Urban water cycle (UWC) observatory**: tool to develop balances for urban water/resource management, integrating data from different water sources (availability, use, losses, nutrient flow) and creating datasets for multiple users (e.g., municipalities, researchers, water utilities) (Lisbon).	3.5
21	**Stormwater reuse management system**: system combining operational management of a stormwater basin and a connected sub-irrigation system for groundwater recharge and direct irrigation; optimises system functioning, based on real time data and model predictions (Flanders).	3.4
	Tools | Water cycle modelling and assessment tools	
22	**UWOT: model for simulation of the urban water cycle from source-to-treatment-to-tap**: UWOT will be extended as part of the Responsible Reuse Framework and the Regional Demand-Supply Matching GIS Tool, acting as an urban water cycle simulation engine for both, to explore alternative scenarios for reuse for changing scales, climatic conditions, and legal/ environmental requirements (Flanders, East Frisia).	3.4, 3.6
23	**Regional demand-supply matching GIS tool**: tool for GIS-based analysis of optimal demand-resource patterns, to identify communal and industrial water requirements and matching with available water resources, calculating, where necessary, transport and treatment requirements. The UWOT model allows to simulate alternative demand & supply options for climate and demand scenarios to rate the resistance of partially decentralized water supply systems (East Frisia).	3.6
24	**Reclaimed water distribution network water quality model**: hydraulic and water quality modelling of reclaimed water distribution network, capable of exporting files to Epanet and incorporating sensor data (e.g., chlorine residuals, temperature, turbidity, pH). Compatible with other Baseform modules in the project. (Lisbon).	3.5
25	**Water-energy-P balance planning module**: module for planning support, extending network water and energy balance analytics to include P balance, mapping supply-demand and alternative sources. Compatible with other Baseform modules in the project (Lisbon).	3.5

Table 4: BWS technology products and data application products as in GA (continued)

#	Technology / tool / demonstration activity	Task
	Tools | Risk assessment tools	
26	**QMRA+: Quantitative microbial risk assessment for water reuse and agriculture**: expansion of AquaNes tool QMRA for drinking water, for application of water reuse and in agriculture (Flanders).	3.4
27	**RA-Reuse: Risk assessment for urban reuse module**: tool based on European regulation and ISO standards to facilitate risk assessment and management for safe water reuse. Deals with health and environmental (surface and ground water) risks (Lisbon).	3.5
	Tools | Water demand analysis and natural resource management tools	
28	**Short-term demand forecasting tool**: calculates a high discretization of water demand analyses and allocation of water resources, based on smart meter data (East Frisia).	3.6
29	**iWidget+ Platform online platform for water information at utility and customers premises**: better information (flow, pressure, temperature, quality) available for leak detection of water supply networks as well as demand management. Builds on past EU projects and delivers a modular FIWARE enabled multi-dashboard (Bodø).	3.3
30	**iWidget+ Platform online platform about I/I for wastewater networks**: better information (energy provision, signal transmission, information management) available for detection of I/I sources in wastewater networks. Delivers a modular FIWARE enabled multi-dashboard (Bodø).	3.3
31	**ASR-pro tool: predicting water quality after subsurface storage**: easy to use hydro-chemical tool for fast prediction of water quality after ASR (Flanders).	3.4
	Tools | Enabling technology	
32	**Digital enabler: integrated digital support system to enable RR and CE at regional scale**: evolve the Digital Enabler Platform from Smart City market from smart agriculture and industry to include water domain. FIWARE based Internet of Everything platform (Venice).	3.7
	Tools | Other	
33	**Climate readiness certification tool**: combine water & energy efficiency (incl. simulator & app). Water/energy efficiency certificates and calibration in pilot municipal facilities/housing (Lisbon).	3.5
34	**Water smartness assessment framework and tool**: a tool to assess the overall gain in water-smartness and sustainability for the LL. Advanced visualisation techniques provide a gamified immersive environment for users to interact with the framework (all LL).	3.9

Extracts of the training action data template

Information on building the BWS Training Portfolio

This workbook is a form to collect information on training actions under the BWS project and is intended to build a common schedule for the project to avoid undesired overlaps.
For each event, the "proposed event form" sheet needs to be filled by the event organisation responsible person and sent to the T1.3 team (mcalmeida@lnec.pt).
The T1.3 team confirms the action date after verification.

Currently, three types of actions are identified:

- Level 1: short courses on BWS products/solutions (e.g., guidelines, governance, policies, technologies) (as per DoW)
- Level 2: state-of-the-art and brainstorming sessions (e.g., brine disposal WP2, performance assessment approaches WP6) (new)
- Level 3: thematic webinars outside the work of BWS but on related topics (e.g., promoted by the LL owners such as those suggested by Lisbon LL - CML) (new)

Responsible partner by level 1 actions should preferably provide a first version of the training sessions planned (as perDoW) until September 30th. Please fill one form per action and alter the file name to: T1.3_Data_TA#_#, where the first # refers to the work package number and the second to the action sequence numbering for that WP.
Organisers can send updated versions of the action info up to six months before the set date. The date should be agreed upon up to 5 months before.

For level 2 and 3 training actions, the filled form should be sent to the T1.3 team as soon as possible, preferably not afte 1 month before the event.

After the action, for all levels, the report template should be filled and sent to the T1.3 team.

B-WaterSmart

Proposed event information to T1.3

Completed by:	<Please fill in your name>			Date:	yyyy-mm-dd		
Event title	<Please fill>			Responsible person	Name:	<Please fill>	
					Institution:	<Please select>	
Event level	<Please select>				Email:	<Please fill>	
Intended timing	Project month (PM)	<Please fill>	Possible dates (max 3)	<Please fill>	Duration	<Please select>	Details on duration <Please fill>
Main target audience	<Please select>		Notes:				
	<Please select>						
	Minimum:	Maximum:	Expected number		Participation fee (€)	<Please fill>	Number of editions <Please fill>
Participants	<Please fill>	<Please fill>	<Please fill>				
Language (English and ...)	<Please select>		Preferred means	<Please select>	Location	<Please indicate if face-to-face selected>	
	Synchronous	Asynchronous					
Learning modes	<Please select>	<Please select>	Details if asynchronous				
List of topics to be addressed	<Please fill>				Learning objectives	<Please fill>	

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Figure 7: Template for gathering information from training action proposers

Information on the portfolio training actions delivered during the project

Table 4: BWS portfolio training delivered in the project (L1) and evaluation
(Nr. responses/ % responses > 4 or 5)

Tool #	Name (product/training)	Resp. partner	Delivery date	Nr.* Partic.	Nr./ % > 4 or 5
1	Water reclamation protocol for potable water reuse in beverage industry	AdTA/LNEC	23/04/2024	17	8/100%
2	High-recovery reverse osmosis	KWR etal	18/06/2024	15[2]	4/100%
3	Effluent reuse for drinking water production	KWR etal	18/06/2024	-[2]	4/100%
4	Compact combinatory treatment technologies for industrial water reuse	Veri/Hydro	05/07/2024	6	3/100%
5	Urban water reuse for agriculture	KWR etal	18/06/2024	-[2]	4/100%
6	Combined treatment of vapour condensate and milk/whey permeate for reuse in dairy industry	IWW etal	15/06/2023	17	3/67%
7	Nitrate-selective EDR	Cetaqua	24/07/2024	7[1]	5/100%
8	Brine electro-chlorination	Cetaqua	24/07/2024	-[1]	5/100%
9	Ammonia evaporation CEVAP	Cetaqua	24/07/2024	-[1]	5/100%
10	Oil & fat co-digestion technology	Cetaqua	26/03/2024	18	9/100%
11	Ammonia recovery from concentrated WWTP streams	Veri/ETRADEPU	25/06/2024	7	5/100%
13	Microturbines for energy recovery	Turbulent	09/07/2024	4	2/100%
14	IoT sensors for infiltration detection	NTNU/TECHNI	Out/Nov 2023	14	1/100%
15	Smart water meters for leak detection	NTNU/TECHNI	Out/Nov 2023	47	1/100%
16	Water-reuse strategic platform	VERI/ENG	27/06/2024	13[3]	6/67%
17	Environment for decision support and alternative course selection	Baseform	12/03/2024	24[4]	5/100%
18	RE-ACTOR: Smart water allocation and negotiation tool for water reuse	CETAQUA/ AMAEM	21/02/2022	8	3/100%
19	Sludge management platform	VERI/ENG	27/06/2024	-[3]	6/67%
20	The Lisbon Observatories – Water and Energy	LEN	22/02/2024	10	6/100%
20	The Lisbon Observatories – Water and Energy	LEN	02/07/2024	7	3/100%
21	Stormwater reuse management system	AQUAFIN/VITO	18/06/2024	-[2]	4/100%
22	UWOT	ICCS/KWR	27/03/2023	13	7/100%
23	Regional demand-supply matching GIS tool	IWW/OOWV	29/06/2023	16	4/100%
24	Reclaimed water distribution network water quality model	Baseform	13/03/2024	24	12/100%
25	Water-energy- phosphorous balance planning module	Baseform	12/03/2024	-[4]	5/100%
26	QMRA+ for water reuse and agriculture	KWR	25/06/2024	9[5]	3/100%
27	Risk Assessment for urban water reuse module	Baseform	12/03/2024	-[4]	5/100%
28	Short-term demand forecasting tool	IWW/OOWV	15/11/2023	8	4/100%
29	Nessie System	ICCS	21/02/2023	23	16/100%
30	Environmental Dashboard	Nordcontact	01/03/2024	10	3/100%
31	SuTRa	KWR	25/06/2024	-[5]	3/100%
32	Digital Enabler	VERI/ENG	27/06/2024	-[3]	6/67%
33	Climate-readiness certification tool	ADENE	12/12/2023	15	3/100%
34	Water smartness assessment framework and tool	ICCS	12/06/2024	12	5/100%
35	Policy and regulation recommendations on water-smartness related topics	LNEC/ICS-UL	29/05/2024	14	1/100%

* Some information was not received or was not available; [1,2,3,4,5] Training sessions for more than one product

Table 5: BWS portfolio training delivered in the project (L2 and L3) and evaluation (Number of responses/ % responses > 4 or 5)

Tool #	Name (product/training)	Resp. partner	Delivery date	Nr*. Partic.	Nr./ % > 4 or 5*
L2_1	Guidance on building a BWS assessment system	LNEC	17/06/21	10	-
L2_2	WP5 Citizen Engagement, ICS-UL	ICS-UL	27/03/23	16	-
L2_3	WP5 Looking ahead: toolkit for policy co-design and implementation, ICS-UL	ICS-UL	28/03/23	17	-
L2_4	WP5 Citizen Science, ICS-UL	ICS-UL	29/03/23	17	-
L2_5	Exploring the potential of ISO 14034 Environmental Technology Verification (ETV) for building market confidence of innovative water solutions	Adelphi, IWW	14/06/24	-	-
L2_6	Circular Economy Indicators Workshop	CETAQUA	15/06/21	21	-
L3_1	Closing the Urban Water Cycle in Lisboa (CML)	CML	31/03/21	-	-
L3_2	Technological products & services for water network management (Baseform)	Baseform	04/04/21	.	-
L3_3	Acqua + Water Efficiency Classification System & SCE (Energy Certification System), ADENE	ADENE	01/10/20	-	-
L3_4	The Lisbon Observatories – Water and Energy	Lisboa-E-Nova	03/12/20	-	-
L3_5	Water distribution system modelling, optimization, and leak detection	NTNU	10/02/23	47	16/90%
L3_6	Agua, innovación y ciudad - Alicante futura	LL Alicante	03/07/23	16	11/100%
L3_7	Alicante and Water	Alicante University	10/11/21	19	-
L3_8	The future of Agriculture: challenges and trends	LL Alicante	14/12/22	15	-

* Some information was not received or was not available

Contents of L1 short courses and minimum requirements for trainees

Tables 6: Contents of L1 short courses and minimum requirements for trainees

#	Technology / tool / demonstration activity
	Technologies | Reuse of water and wastewater
1	**Water reclamation protocol for potable water reuse in beverage industry**: showcase safe potable water reuse by food & beverage industry compatible with certification by health and environmental authorities, increase industry resilience to climate change by introducing a climate independent water source (Lisbon).
	Leading partner Águas do Tejo Atlântico (AdTA) with the cooperation of LNEC.
	Draft contents • Water quality guidelines, comprising the minimum requirements for monitoring of physical-chemical and microbiological parameters in the reclaimed water. • Fundamentals, mechanisms and key operating conditions and parameters of ozonation and reverse osmosis for advanced wastewater treatment for safe water reclamation & reuse. • Ozonation and reverse osmosis operational guidelines, which includes the (i) start-up of the treatment facility, (ii) validation/optimization of operational parameters and of clean-in-place (CIP) routines, (iii) validation monitoring of the performance targets (incl. microbial and chemical contaminants of emerging concern), (iv) regular operation & maintenance and water quality monitoring.
	Minimum competences requirements for trainees Knowledge on water/wastewater treatment or on water quality.

#	Technology / tool / demonstration activity
	Technologies | Reuse of water and wastewater
2	**High-recovery reverse osmosis**: integration in existing drinking water treatment train. Showcase high recovery reverse osmosis as a solution to increase robust water production by decreasing the raw water quality demands for intake in drinking water production, hence increasing regional system resilience. [Description differs from the GA. The version presented here is in line with the one in the request for the first amendment of the GA, approval pending]. **See table #3**.

#	Technology / tool / demonstration activity
	Technologies and tools | Solutions for alternative water sources and their potential contribution to a more robust and climate-proof water system (training activities of #2, #3 and #5[1])
2, 3 & 5	**2. High-recovery reverse osmosis**: integration in existing drinking water treatment train. Showcase high recovery reverse osmosis as a solution to increase robust water production by decreasing the raw water quality demands for intake in drinking water production, hence increasing regional system resilience. [Description differs from the GA. The version presented here is in line with the one in the request for the first amendment of the GA, approval pending]. **3. Effluent reuse for drinking water production**: technology demonstration of effluent reuse for drinking water, introducing alternative drinking water resources to increase regional resiliency. Implementation of quality (nutrients and emerging contaminants) and safety (pathogens removal) controls (Flanders). **5. Urban water reuse for agriculture**: technology demonstration of urban stormwater reuse for agriculture, introducing alternative water resources for irrigation. Implementation of quality (nutrients and emerging contaminants) and safety (removal of pathogens) controls (Flanders).
	Leading partner KWR (De Watergroep, Aquafin, Proef, Mechelen, Vito)
	Draft contents In this training the approach, results and findings from the demonstration site will be shared and put in their regional context. Different options to improve water system robustness will be shared. These include expanding drinking water treatment capacity with advanced purification systems, the potential and basic requirements for effluent reuse for drinking water, as well as options for rainwater reuse for irrigation to address water demand for farmers and reduce pressure on groundwater. The technical demonstrations will be connected to the results of the modelling and tool development (#21, #22, #26, #31) to show how they can contribute to smart water solutions. The objective of this training is to give attendees insight into different options for the implementation alternative water sources, their requirements and key success factors, and their potential to contribute to solving water challenges for the region. The training will have a webinar format.
	Minimum competences requirements for trainees The training is targeted at water professionals and water managers.

[1] *Technologies #2, #3 and #5 have been combined into one training activity. This training activity will also be related with the tools #21, #22, #26, #31.*

#	Technology / tool / demonstration activity
	Technologies | Reuse of water and wastewater
4	**Compact combinatory treatment technologies for industrial water reuse**: demonstration of the possibility of extending water reuse at industrial level by applying a chosen multiple treatment sequence (including ultrafiltration, nanofiltration and reverse osmosis) (Venice). **Leading partner** VERI/HYDRO **Draft contents** Webinar/online short course including the following topics: • Main objectives of the technology. • Technology overview: how and where. • Our demonstration: goals, different qualities of water investigation for minimal treatment chain individuation, quality suitability in relation to destination, end-users' attitude towards the recovered product. • Balances and carbon footprint evaluations. • Opportunities and limits of the technology (other applications). Intended timing: late 2023. Duration: 2-3 hours. Target audience: decision makers for products exploitation and technology selling/adoption, specifically authorities, utilities, sectoral associations (industrial associations) and end-users, research community and other stakeholders directly/indirectly involved in the production and supply chain. The content of the training will be tailored according to the progress of the activity in terms of feasibility, advantages and barriers identified. **Minimum competences requirements for trainees** Basic knowledge on conventional wastewater treatment processes.

#	Technology / tool / demonstration activity
	Technologies | Reuse of water and wastewater
5	**Urban water reuse for agriculture**: technology demonstration of urban stormwater reuse for agriculture, introducing alternative water resources for irrigation. Implementation of quality (nutrients and emerging contaminants) and safety (removal of pathogens) controls (Flanders). Training will be integrated with #3 and #21. **See table #3**.

#	Technology / tool / demonstration activity
	Technologies | Reuse of water and wastewater
6	**Combined treatment of vapour condensate and milk/whey permeate for reuse in dairy industry**: higher stability and flexibility of the process, more efficient and competitive, exportable into markets with high barriers for approval by authorities. Enables quick shift between different qualities fit for different purposes. Better control of hygiene status of treated water through smart monitoring. Lower barrier for approval by health/food authorities (East Frisia).
	Leading partner IWW (with contributions from OOWV, DMK and ENV)
	Draft contents Webinars (one for international audience, one for German audience; approx. 2 hours each) consisting of 3 presentations on the following topics: 1. Potential of water reuse in the dairy industry: overview of vapour condensate treatment technologies (e.g., incl. virtual tour of pilot plant). 2. Strategies to control and optimise the performance and stability of the process. Digital plant management: potential use for maintenance and process monitoring (e.g., WaterExpert etc.).
	Minimum competences requirements for trainees The training is targeting: • Dairy processing industry staff (e.g., environmental officers from other producers). • (Future) operators of water recycling plants. • Technology developers. • Representatives of authorities. with basic education in water treatment/wastewater treatment: engineering/science background.

#	Technology / tool / demonstration activity
	Technologies | Recovery of energy and materials from water and wastewater (training activities of #7 and #8[2])
7 & 8	**7. Nitrate-selective EDR**: separate nitrates from wastewater effluents, manage separately for: nutrient recovery, water reuse in fertigation. Recovery of nutrients in WWTP effluents for irrigation instead of spending energy in eliminating nutrients (Alicante). **8. Brine electro-chlorination**: use of brines from RO in tertiary treatment of WWTP, generate hypochlorite for effluent disinfection and membrane cleaning. Lowering dependence in hypochlorite purchased externally, lowering of salinity in brines to be disposed of (Alicante).
	Leading partner CETAQUA
	Draft contents • Context: brines management. • Brine minimisation and valorisation routes. • SED + EC: The B-WaterSmart circular approach. • Expected benefits.
	Minimum competences requirements for trainees Knowledge on water treatment technologies and basic knowledge on membrane processes. BSc in chemical engineering, environmental science, or related fields.

[2] *Technologies #6 and #7 have been combined into one training activity according to the LL partners.*

#	Technology / tool / demonstration activity
	Technologies | Recovery of energy and materials from water and wastewater
8	**Brine electro-chlorination**: use of brines from RO in tertiary treatment of WWTP, generate hypochlorite for effluent disinfection and membrane cleaning. Lowering dependence in hypochlorite purchased externally, lowering of salinity in brines to be disposed of (Alicante). **See table #7**.

#	Technology / tool / demonstration activity
	Technologies | Recovery of energy and materials from water and wastewater
9	**Ammonia evaporation CEVAP**: evaporation and recovery of liquid ammonia from sludge returns. Recovery of nutrients from the sludge to avoid disposal of ammonia-rich sludges. Use of liquid ammonia in DENOX industry (Alicante).
	Leading partner CETAQUA
	Draft contents • Context. Nutrients in WWTPs: impact and potential. • CEVAP Low Thermal evaporator. • Integration of the solution in Alicante.
	Minimum competences requirements for trainees Knowledge on water treatment technologies. BSc in chemical engineering, environmental science, or related fields.

#	Technology / tool / demonstration activity
	Technologies | Recovery of energy and materials from water and wastewater
10	**Oil & fat co-digestion technology**: use of waste from primary treatment to promote co-digestion and increase biomethane generation. Lowering disposal of waste from the WWTP (Alicante).
	Leading partner CETAQUA
	Draft contents • Theoretical background. • Co-substrates identification and characterisation. • Environmental and economic assessment of the Alicante solution.
	Minimum competences requirements for trainees Knowledge on wastewater treatment or biological processes.

#	Technology / tool / demonstration activity
	Technologies | Recovery of energy and materials from water and wastewater
11	**Ammonia recovery from concentrated WWTP streams**: pilot phase, optimise anaerobic digestion of mixtures of sludge and liquid special waste, enhance ammonia concentrations before stripping. Demonstration of nutrients recovery by integration at WWTP (Venice).
	Leading partner VERI/ETRA/DEPU
	Draft contents Webinar/online short course including the following topics: • Main objectives of the technologies (stripping A+C). • Technologies overview, how and where. • Our demonstration: goals, ammonium sulphate salt potentialities as fertilizer, technologies comparison (stripping A vs. stripping C), end-users' attitude towards the recovered product. • Balances and carbon footprint evaluations. • Potential opportunities for CE and limits. Intended timing: late 2023. Duration: 2-3 hours. Target audience: decision makers for products exploitation and technology selling/adoption, specifically authorities, utilities, sectoral associations (agricultural and industrial associations) and end-users, research community and other stakeholders directly/indirectly involved in the production and supply chain. The content of the training will be tailored according to the progress of the activity in terms of feasibility, advantages and barriers identified.
	Minimum competences requirements for trainees Basic knowledge on conventional wastewater treatment processes

#	Technology / tool / demonstration activity
	Technologies | Recovery of energy and materials from water and wastewater
12	**Efficient small-scale biogas production at small WWTP**: distributed energy provision from small WWTP will save energy provided by traditional sources (i.e., electricity system), e.g., in thermal energy for domestic and underground heating systems for de-icing of roads (Bodø).
	Leading partner KRKA and SINTEF
	Draft contents This course is designed with the objective of enriching the technical knowledge for those who are working in the field of energy production, wastewater treatment, municipal planner, etc. and renewable energy enthusiasts and environmentalists. The topics include: 1. Renewable energy: practical introduction to biogás. 2. Key processes: biogas production, possible co-substrates, operation, management of a biogas plant. 3. Overview of different applications of biogás. 4. Biogas in a circular economy (Examples from case studies).
	Minimum competences requirements for trainees Basic knowledge on wastewater plant operation, some understanding of biochemistry and microbiology; Interest in renewable energy.

#	Technology / tool / demonstration activity
	Technologies | Recovery of energy and materials from water and wastewater
13	**Microturbines for energy recovery**: use of microturbines to recover energy from the WWTP effluent for internal reuse of the generated energy (Alicante).
	Leading partner Turbulent
	Draft contents • Basics: Hydropower. • Technical design of the solution. • Case studies and application on WWTP.
	Minimum competences requirements for trainees Basic knowledge on hydraulics.

#	Technology / tool / demonstration activity
	Technologies | Smart management of water systems and infrastructure
14 & 15	**14. IoT sensors for infiltration detection:** to improve information available for detection of I/I sources in wastewater networks, improved signal transmission and energy solutions (Bodø). **15. Smart water meters for leak detection**: demonstration of leak detection and water quality sensors in an integrated solution with microturbine capabilities to generate enough power to transmit auxiliary data from household smart water meters. This gives significantly improved and more distributed information available for leak detection of water supply networks (Bodø).
	Leading partner NTNU, Techni
	Draft contents • Necessity of management of infiltration/inflow into the sewage network. • Importance of leak detection and management in water networks. • Smart monitoring of urban water systems. • Introduction to Internet of Things (IoT Basics): application in urban water systems.
	Minimum competences requirements for trainees Basic knowledge and skills in designing and operation of drainage/wastewater and water systems.

#	Technology / tool / demonstration activity
	Technologies | Smart management of water systems and infrastructure
15	**Smart water meters for leak detection**: demonstration of leak detection and water quality sensors in an integrated solution with microturbine capabilities to generate enough power to transmit auxiliary data from household smart water meters. This gives significantly improved and more distributed information available for leak detection of water supply networks (Bodø). **See table #14.**

#	Technology / tool / demonstration activity
	Tools | Monitoring, negotiation, and decision support tools
16	**Water reuse strategic platform**: FIWARE–based Platform based on ENG's Digital Enabler to support standardized/ transferable evaluations and communication among stakeholders for the assessment of economical/ environmentally sustainable water reuse opportunities. Will provide a shared evaluation model to support objective, traced and updatable decisions (Venice).
	Leading partner VERI/ENG
	Draft contents[2] Training includes the following topics: • An **overview presentation** of the water reuse strategic platform, introducing the users to its contents and functionalities. • A **hands-on training** presentation serving as a step-by-step guide to use the different functionalities of the Water reuse strategic platform. • **Recorded webinars/live demo or screencasts** demonstrating scenarios of use of interest to the target audience will be presented.
	Minimum competences requirements for trainees • Competence on using web browsers and web applications. • Background related to water management and the related processes is a plus.

[2] *Components of #32 - Digital Enabler are used to develop the two platforms of the Venice LL (#16 Water reuse strategic platform and #19 Sludge management platform). Training will be delivered for those two platforms and thus there is no need to provide separate training on the Digital Enabler (#32).*

#	Technology / tool / demonstration activity
	Tools | Monitoring, negotiation, and decision support tools
17	**Environment for decision support and selection of alternative courses of action:** city and sector prioritization and decision-making environment, based on sets of key analytics, including water, energy, and nutrient balances; performance, risk, and cost analytics. Expressed numerically and graphically on a georeferenced 2D/3D cityscape environment. (Lisbon).
	Leading partner Baseform
	Draft contents 1. Introduction to the tool's objectives, inputs, and outcomes. 2. Introduction to the operating environment and overview of the user interface. 3. Configuring analysis settings and understanding decision-making basics. 4. Running an analysis and examining results. 5. Exporting results.
	Minimum competences requirements for trainees • Basic knowledge of water, energy, and nutrients balances. • Basic knowledge of reused water management.

#	Technology / tool / demonstration activity
	Tools | Monitoring, negotiation, and decision support tools
18	**RE-ACTOR: Smart water allocation and negotiation tool for water reuse**: real time water quality and risk monitoring to ensure acceptability of the different water end-users and to visualize the economic and environmental benefits of using the water. Engagement of stakeholders in decision-making through simulation of potential water reuse scenarios (Alicante).
	Leading partner CETAQUA / AMAEM
	Draft contents • Log-in and basic features of the tool. • Architecture of the tool. • Creation of a baseline scenario. • Creation of results scenarios. • Impact assessment and results interpretation. • Administration role: parameters modification.
	Minimum competences requirements for trainees • Competence on using PCs with Windows and web-apps. • Background related to (urban) water management and related processes (studies in engineering, hydrology, environmental systems, geology and chemistry, urban development and planning etc.) is a plus.

#	Technology / tool / demonstration activity
	Tools | Monitoring, negotiation, and decision support tools
19	**Sludge management platform**: based on ENG's Digital Enabler, development of FIWARE–based Platform to support the identification of the optimum sewer sludge valorisation system, to foster energy and resource reuse/recovery. Platform will allow evaluation and ranking of treatment options, considering geographical, environmental, economic, social, and political barriers (Venice).
	Leading partner VERI/ENG
	Draft contents[3] Training includes the following topics: • An **overview presentation** of the Sludge management platform, introducing the users to its contents and functionalities. • A **hands-on training** presentation serving as a step-by-step guide to use the different functionalities of the Sludge management platform. **Recorded webinars/live demo or screencasts** demonstrating scenarios of use of interest to the target audience.
	Minimum competences requirements for trainees • Competence on using web browsers and web applications. • Background related to sludge management and the related processes is a plus.

[3] *Components of #32 - Digital Enabler are used to develop the two platforms of the Venice LL (#16 Water reuse strategic platform and #19 Sludge management platform). Training will be delivered for those two platforms and thus there is no need to provide separate training on the Digital Enabler (#32).*

#	Technology / tool / demonstration activity	
	Tools | Monitoring, negotiation, and decision support tools	
20	**Urban water cycle (UWC) observatory**: tool to develop balances for urban water/resource management, integrating data from different water sources (availability, use, losses, nutrient flow) and creating datasets for multiple users (e.g., municipalities, researchers, water utilities) (Lisbon). The tool is a visualization instrument for monitoring and communicating performance, support urban planning and decision making. The observatory follows the motto “to know so to reduce”. The tool is divided into two accesses. A public area with open data information of the water and wastewater city dimensions and a private area for individual entities allowing each of them to integrate and analyse, via a set of data analytics, the water consumption of their facilities. **Leading partner** Lisboa E-Nova **Draft contents** • An **overview presentation** of the UWC Observatory, introducing the users to its content and role. • **Recorded webinars/live demo and screencast** demonstrating the tool and its features. **Minimum competences requirements for trainees** • Competence on using personal computers with Windows. • Updated browser (except internet explorer). • Familiarity with XLS, CSV, PDF, PNG. • Basic knowledge of water consumption units.	

#	Technology / tool / demonstration activity	T
	Tools | Monitoring, negotiation, and decision support tools	
21	**Stormwater reuse management system**: system combining operational management of a stormwater basin and a connected sub-irrigation system for groundwater recharge and direct irrigation; optimises system functioning, based on real time data and rainfall forecasts (Flanders). **Leading partner** AQUAFIN/ VITO **Draft contents** This training will be a demo-session of the stormwater management tool for future operators of the stormwater reuse system. Content will depend on the final operability of the storm water management tool, but can include for example: • User guidelines for future operators. • Reflections on potential use cases. • Hands-on demo of the local and remote-control functions of the system, covering both normal system. state and anticipated failure scenarios. **Minimum competences requirements for trainees** The training & demo are targeted at operators of (waste)water infrastructure and, where concerned, stakeholders interested in the internal workings of the control, e.g., the municipality. Basic experience of controlled systems and the handling of SCADA-systems is desirable. Basic experience in the interpretation of monitoring data within a hydraulic/hydrologic context is a plus.	

#	Technology / tool / demonstration activity	T
	Tools | Water cycle modelling and assessment tools	
22	**UWOT: model for simulation of the urban water cycle from source-to-treatment-to-tap**: UWOT will be extended as part of the Responsible Reuse Framework and the Regional Demand-Supply Matching GIS Tool, acting as an urban water cycle simulation engine for both, to explore alternative scenarios for reuse for changing scales, climatic conditions, and legal/ environmental requirements (Flanders, East Frisia).	
	Leading partner ICCS / KWR	
	Draft contents Training includes: • An **overview presentation** of UWOT model introducing the users to its content and role, explaining the way it works and providing results of its application to case studies and insights from past projects. • A **UWOT short guide and FAQ** on installation and usage along with the most typical issues and their solutions. • A **UWOT hands-on training** presentation serving as a step-by-step guide to create a topology and run a simulation using UWOT model. • **Demo timeseries** of UWOT model to perform the hands-on training. • **Recorded webinars/live demo or screencasts** demonstrating scenarios of use of interest to the target audience.	
	Minimum competences requirements for trainees • Competence on using PCs with Windows. • Familiarity with MS Office tools, particularly Excel. • Basic knowledge of handling delimited text files (e.g., using Notepad). • Background related to (urban) water management and related processes (studies in engineering, hydrology, environmental systems, geology and chemistry, urban development and planning etc.) is a plus.	

#	Technology / tool / demonstration activity	T
	Tools | Water cycle modelling and assessment tools	
23	**Regional demand-supply matching GIS tool**: tool for GIS-based analysis of optimal demand-resource patterns, to identify communal and industrial water requirements and matching with available water resources, calculating, where necessary, transport and treatment requirements. The UWOT model allows to simulate alternative demand & supply options for climate and demand scenarios to rate the resistance of partially decentralized water supply systems (East Frisia).	
	Leading partner IWW (with contributions from OOWV)	
	Draft contents Webinar (approx. 2,5 hours) consisting of presentations and demonstrations on the following topics: • Introduction to target application areas and main functionalities of the tool. • High level overview of the tool architecture. • Deep dive into data requirements and (possible) open access data sources. • Demo: a. How to customize the tool to your own case study. b. Use case examples from LL East Frisia.	
	Minimum competences requirements for trainees • Basic knowledge in handling GIS data (e.g., shape file) and working with GIS tools. • Background related to water resources management and the related processes (studies in engineering, hydrology, environmental systems, geology and chemistry, urban development and planning etc.) is a plus.	

#	Technology / tool / demonstration activity	T
	Tools | Water cycle modelling and assessment tools	
24	**Reclaimed water distribution network water quality model**: hydraulic and water quality modelling of reclaimed water distribution network, capable of exporting files to Epanet and incorporating sensor data (e.g., chlorine residuals, temperature, turbidity, pH). Compatible with other Baseform modules in the project. (Lisbon).	
	Leading partner Baseform	
	Draft contents 1. Introduction to the tool's objectives, inputs, and outcomes. 2. Introduction to the operating environment and overview of the user interface. 3. Configuring input files. 4. Running the analysis. 5. Examining results in the software. 6. Exporting results to common formats.	
	Minimum competences requirements for trainees • Hydraulic models of water distribution systems. • Basic knowledge of the kinetics of waterborne substances in pressure flow.	

#	Technology / tool / demonstration activity	T
	Tools | Water cycle modelling and assessment tools	
25	**Water-energy-P balance planning module**: module for planning support, extending network water and energy balance analytics to include P balance, mapping supply-demand and alternative sources. Compatible with other Baseform modules in the project (Lisbon). **Leading partner** Baseform **Draft contents** 1. Introduction to the tool's objectives, inputs, and outcomes. 2. Introduction to the operating environment and overview of the user interface. 3. Configuring input files and analysis settings. 4. Running an analysis; exploring alternatives and understanding balances: water, energy, nutrients. 5. Examining results in the software. 6. Exporting results. **Minimum competences requirements for trainees** • Basic knowledge of water, energy, and nutrients balances. • Basic knowledge of reused water management.	

#	Technology / tool / demonstration activity	T
	Tools | Risk assessment tools	
26	**QMRA+: Quantitative microbial risk assessment for water reuse and agriculture**: expansion of AquaNes tool QMRA for drinking water, for application of water reuse and in agriculture (Flanders). **Leading partner** KWR **Draft contents** • Reflection and recommendation on the use of the tool and integration of its results in determining purification requirements for water reuse will be included in the training under #3. • User guidelines are available as part of the reporting from the AquaNes project and will be updated where relevant. **Minimum competences requirements for trainees** It is recommended to only use this tool with the guidance of a qualified expert in microbial water safety planning.	

#	Technology / tool / demonstration activity	T
	Tools | Risk assessment tools	
27	**RA-Reuse: Risk assessment for urban reuse module**: tool based on European regulation and ISO standards to facilitate risk assessment and management for safe water reuse. Deals with health and environmental (surface and ground water) risks (Lisbon).	
	Leading partner Baseform	
	Draft contents 1. Introduction to the tool's objectives, inputs, and outcomes. 2. Introduction to the operating environment and overview of the user interface. 3. Configuring analysis settings and understanding help resources. 4. Running an analysis: human risk and environmental risk. 5. Examining results in the software and revising analysis settings for sensitivity analysis. 6. Submitting final scores; running a definitive analysis. 7. Exporting results.	
	Minimum competences requirements for trainees Familiarity with ISO standards (TC 282 Water Reuse): • ISO 16075 Guidelines for treated wastewater use for irrigation projects (2020, 2021); • ISO 20426:2018 Guidelines for health risk assessment and management for non-potable water reuse; • ISO 20761:2018 Guidelines for water reuse safety evaluation. Familiarity with EU regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse.	

#	Technology / tool / demonstration activity	T
	Tools | Water demand analysis and natural resource management tools	
28	**Short-term demand forecasting tool** calculates a high discretization of water demand analyses and allocation of water resources, based on smart meter data (East Frisia).	
	Leading partner IWW (with contributions from OOWV)	
	Draft contents Webinar (approx. 2 hours) consisting of presentations and demonstrations on the following topics: • Presentation: Motivation and functionality of the tool. • Presentation: High level overview of the tool architecture (frontend, backend, smart meters, FIWARE components). • Demo: how to interact with the frontend to create forecasting models and using them for generating short-term demand forecasts.	
	Minimum competences requirements for trainees • Competence on using a web browser. • Basic data interpretation skills / good understanding of data (e.g., familiarity with the concept of time series data).	

#	Technology / tool / demonstration activity	T
	Tools | Water demand analysis and natural resource management tools	
29	**Nessie system**: better information at a householder level (e.g., flow, pressure, temperature, quality) available for leak detection of water supply networks as well as demand management. Builds on past EU projects and delivers a modular FIWARE enabled multi-dashboard (Bodø)[4].	
	Leading partner ICCS	
	Draft contents Training includes: • An overview presentation of Nessie system introducing the system, explaining the way it works and providing results of its application to case studies and insights from past projects. • Session using recorded (videos) and live demonstrations of implementations of the system from past projects. Training material includes: • Guide to explain the features of API of the system which allow third-party applications (models, analytics) to integrate with the system and exchange data.	
	Minimum competences requirements for trainees • Competence on using personal computers and server applications • Background related to (urban) water management and the related processes (studies in engineering, hydrology, environmental systems, geology and chemistry, urban development and planning etc.) is a plus. • Background related to ftp-type communications and application programming interface (API)	

[4] *Initial developments of Nessie system have been implemented in the iWidget project. The former known as iWidget platform (as described in DoW) gradually evolved into the Nessie system.*

#	Technology / tool / demonstration activity	T
	Tools | Water demand analysis and natural resource management tools	
30	**Environmental dashboard**[5]: better information (energy provision, signal transmission, information management) available for detection of I/I sources in wastewater networks. Delivers a modular FIWARE enabled multi-dashboard (Bodø).	
	Leading partner NORDKONTAKT	
	Draft contents Recorded webinars/live demo demonstrating dashboards functionalities with multiple data sources.	
	Minimum competences requirements for trainees Solution will be intuitive, and there will be no need for special prior knowledge.	

[5] *Tool #30 was described in DoW as "iWidget+ Platform (or Fiware enabled multidashboard)" and was renamed to "Environmental Dashboard" during current project development.*

#	Technology / tool / demonstration activity
	Tools | Water demand analysis and natural resource management tools
31	**SuTRa**: easy to use hydro-chemical tool that helps predict the removal of (plant) pathogens during subsurface storage and transport. The intended use of the tool is to help determine the minimum design parameters for subsurface storage and infiltration solutions (Flanders)[6].
	Leading partner KWR
	Draft contents • Reflection and recommendation on the use of the tool and its use in designing subsurface water storage solutions will be included in the training under #3.to be completed. • User guidelines will be included as part of the reporting on the tool.
	Minimum competences requirements for trainees The tool is targeted for use by hydrologists in research and consulting organizations.

[6] *The tool was formerly known as ASR pro but it was renamed to SuTRa. Additional information has been provided in tool's description (compared to DoW) based on its application to the Flanders LL.*

#	Technology / tool / demonstration activity
	Tools | Enabling technology
32	**Digital enabler: integrated digital support system to enable RR and CE at regional scale**: evolve the Digital Enabler Platform from Smart City market from smart agriculture and industry to include water domain. FIWARE based Internet of Everything platform (Venice). **See tables #16 and #19**.

#	Technology / tool / demonstration activity
	Tools | Other
33	**Climate readiness certification tool**: combine water & energy efficiency (incl. simulator & app). Water/energy efficiency certificates and calibration in pilot municipal facilities/housing (Lisbon).
	Leading partner ADENE
	Draft contents Training includes: • Presentation of the Climate Ready Certificates Methodology, and its usability in the platform. A manual of the methodology application is provided as support material. • Case studies, from the application of the methodology in different pilot's typology (households, buildings, and neighbourhoods).
	Minimum competences requirements for trainees • Competence on using PCs with Windows. • Familiarity with MS Office tools, particularly Excel. • Background related to (urban) water and energy management and the related processes (studies in engineering, energy, sustainability, hydrology, environmental systems, urban development and planning etc.) is a plus.

#	Technology / tool / demonstration activity
	Tools | Other
34	**Water smartness assessment framework and tool**: a tool to assess the overall gain in water-smartness and sustainability for the LL.
	Leading partner ICCS
	Draft contents The training L1 will be organized under the umbrella of WP3, Task 3.9 towards the end of the project; it is envisaged that it will take advantages from the cooperation of WP6 and 3: WP6 will provide information about the concept of the B-WaterSmart assessment framework including examples from the InAll validation experience and the training exercises tailored for the InAll; Task 3.9 will organize the training activity around the dashboard, as the actual product to train about. The training is expected to include presentation of the tool and its functionalities. The exact training content will be decided at the later stage once the developments on the dashboard have started.
	Minimum competences requirements for trainees • The BWS AF (Water smartness assessment framework) addresses the strategic level of decision makers; further competence requirements related to the provision of data will be defined at later stage. • Competence on using personal computers, additional requirements to be provided at a later stage.

Contents of L2 and L3 short courses

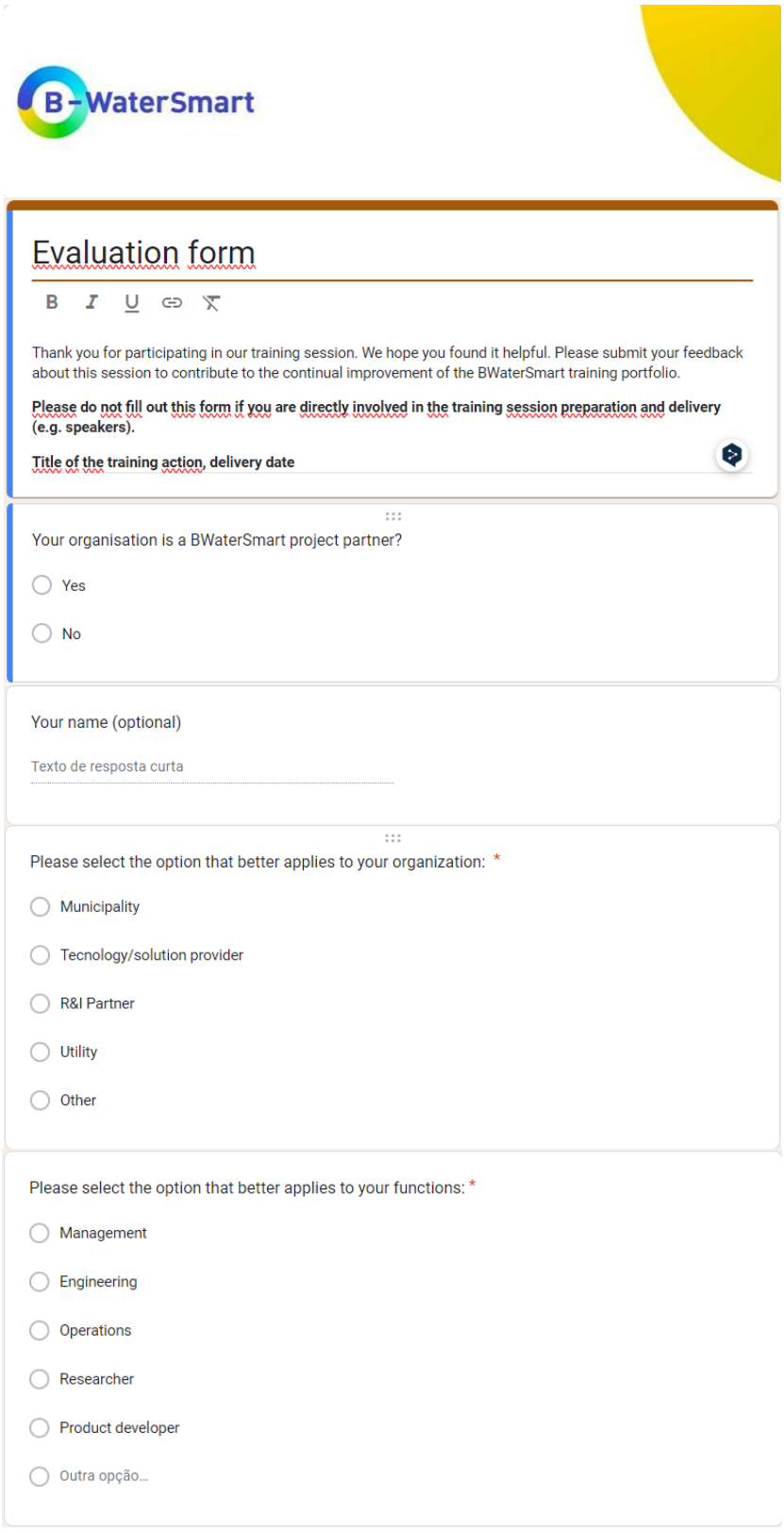
Table 7: Contents of L2 and L3 short courses

ID	Name (product/training)	Resp. partner	Delivery date	Action objectives	Topics addressed
L2_1	Guidance on building a BWS assessment system	LNEC	17/06/21	Participants should be able to: • understand and select assessment criteria, metrics, reference values and targets; • results interpretation; • deal with accuracy and reliability	• Introduction to assessment systems; • How to define assessment criteria; • How to define metrics; • Data accuracy and reliability: assessment/implications; • How to set reference values and targets; • Reporting and evaluation of results; • Avoiding common mistakes • Hands-on exercise; • Discussion
L2_2	WP5 Citizen Engagement	ICS-UL	27/03/23	Participatory methodologies between institutional spaces and civic activation	Governance and social inclusion
L2_3	WP5 Looking ahead: toolkit for policy co-design and implementation	ICS-UL	28/03/23	Participatory methodologies with stakeholders	Governance and social inclusion
L2_4	WP5 Citizen Science	ICS-UL	29/03/23	Citizen science	Governance and social inclusion
L2_5	Exploring the potential of ISO 14034 Environmental Technology Verification (ETV) for building market confidence of innovative water solutions	Adelphi, IWW	14/06/24	After the training, participants know the benefits of the ETV scheme, eligibility criteria and how to apply.	1. ISO 14034 ETV introduction to the scheme, benefits, process briefly, eligibility criteria, where to verify; 2. ISO 14034 ETV: verification process step by step with practical examples: • role of applicant, role of verifier, role of test body in the process; • how to develop application, LIFEproETV tools to help with the application; • proposing a relevant performance claim; • performance claim vs specification of performance parameters to be verified; • testing for the needs of ETV: 3. How to implement ETV in an R&I project; 4. Individual consultations for interested companies
L2_6	Circular Economy Indicators Workshop	CETAQUA	15/06/21	Explain a literature review of circular economy indicators available and to choose which are the most relevant indicators for each LL context	Circular economy indicators
L3_1	Closing the Urban Water Cycle in Lisboa (CML)	CML	31/03/21	This thematic webinar presents Lisbon's green infrastructure developments and its contribution to climate change adaptation.	In the last 10 years, Lisbon has implemented and consolidated a green infrastructure organised in 9 green corridors, representing a 20% increase in green areas. These green corridors ensure an ecological continuum providing services to citizens: shadowing to face the heat island effect; water retention and infiltration to reduce the effects of flooding; increasing urban biodiversity; improving air quality.
L3_2	Technological products & services for water network management (Baseform)	Baseform	04/04/21	This thematic webinar aims to divulge and share the activities of the partner Baseform connected with BWS project.	Presentation of Baseform, a Software-as-a-Service for water utilities, providing comprehensive, actionable analytics to support their efficiency, effectiveness and sustainability in managing water and energy. It leverages existing data, sensorisation and IT systems towards a measurable return on key outcomes such as managing water & energy losses, wastewater, infiltration & inflow, or infrastructure planning. Overview of the vision, technology and product, target client profiles and application scenarios, illustrating with utility cases and usage stories.

Table 88: Contents of L2 and L3 short courses (continued)

ID	Name (product/training)	Resp. partner	Delivery date	Action objectives	Topics addressed
L3_3	Acqua + Water Efficiency Classification System & SCE (Energy Certification System), ADENE	ADENE	01/10/20	This thematic webinar is on AQUA+®and Climate Ready Certificates, developed by the partner Adene.	The already implemented AQUA+® and the upcoming Climate Ready Certificates (CRC) are two water and water energy nexus efficiency rating tools for buildings promoted by ADENE. AQUA+® is a voluntary system to assess and classify water efficiency and reuse performance in households, promoting water efficient fixtures and equipment, rainwater harvesting, greywater systems, smart metering, leakage control, water-energy nexus and guidance to operators and occupants.
L3_4	The Lisbon Observatories – Water and Energy	Lisboa-E-Nova	03/12/20	This thematic webinar was on the tools developed by the partner Lisboa e-Nova (LEN) to inform the public in Lisbon about water and energy consumption.	"The Lisbon Observatories" are tools developed by LEN for Lisbon, aiming at monitoring and communicating environmental performance, while supporting urban planning and decision making in city's sustainability policies. The motto is "to know so to reduce". The information provided for each type of user is explained (https://observatorios-lisboa.pt/). Areas developed include energy and water consumption, wastewater and solid waste production and treatment, and in greenhouse gas emissions, with different types of disaggregation. Private access of adherent institutions offers visualization of the entity' electricity and water consumption and cost per installation and typology of use whenever access to remote metering is available. The tool provides insightful management of water consumption and electricity consumption supported by data analytics and custom performance reports."
L3_5	Water distribution system modelling, optimization, and leak detection	NTNU	10/02/23	Thematic webinar on water distribution system modelling, optimization, and leak detection	•Optimization for water distribution systems; • Variable autoencoders for leak detection; • Dual model for leak localization; • Graph neural networks for water distribution system modelling; • Evaluating the generalizability and transferability of water distribution deterioration models
L3_6	Agua, innovación y ciudad - Alicante futura	LL Alicante	03/07/23	Give an overview about topics related to water, innovation and city in Alicante	Innovation in cities
L3_7	Alicante and Water	Alicante University	10/11/21	Give and overview on impacts of climate change and the relationship between water and the city of Alicante	Climate change, water use in Alicante
L3_8	The future of Agriculture: challenges and trends	LL Alicante	14/12/22	Give insight in general context, big challenges, regulatory framework and present AGBAR case studies using reclaimed water in agriculture.	Challenges in Agriculture, opportunities of water reuse in agriculture

Google form template for participants evaluation of training actions



Evaluation form

Thank you for participating in our training session. We hope you found it helpful. Please submit your feedback about this session to contribute to the continual improvement of the BWaterSmart training portfolio.

Please do not fill out this form if you are directly involved in the training session preparation and delivery (e.g. speakers).

Title of the training action, delivery date

Your organisation is a BWaterSmart project partner?

- Yes
- No

Your name (optional)

Texto de resposta curta

Please select the option that better applies to your organization: *

- Municipality
- Tecnology/solution provider
- R&I Partner
- Utility
- Other

Please select the option that better applies to your functions: *

- Management
- Engineering
- Operations
- Researcher
- Product developer
- Outra opção...

Please indicate your impressions of the items listed below.

Descrição (opcional)

1. The training met my expectations *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

2. I will be able to apply the knowledge learned. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

3. The content was organized and easy to follow. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

4. The materials distributed were pertinent and useful. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

5. The trainer(s) was(were) knowledgeable. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

6. The quality of instruction was good. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

7. The trainer met the training objectives. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

8. Class participation and interaction were encouraged. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

9. Adequate time was provided for questions and discussion. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

10. How do you rate the training overall? *

- ○ 1. Poor
- ○ 2. Fair
- ○ 3. Satisfactory
- ○ 4. Good
- ○ 5. Excellent

11. What aspects of the training could be improved?

Texto de resposta longa

12. Topics of interest for future training actions?

Texto de resposta longa

Thank you for your participation.

Descrição (opcional)

Annex 2 | B-WaterSmart training: Guidance document for trainers

Contents

A1 Introduction[1]

B-WaterSmart training actions are aimed at ensuring capacity building on the water-smart solutions and products developed during the project, optimising their value while promoting transfer potential and ensuring that products correspond to the stakeholders' needs and expectations. Active learning is key to ensure the aims of the project.

B-WaterSmart training is not limited to project products and solutions. The B-WaterSmart approach integrates three levels of training actions aimed at covering related subjects found relevant to capacity building for increasing water-smartness for those directly involved in the project but also for the public. Thus, it can contribute to knowledge accessibility and uptake and reach actors outside the consortium and the public as part of the knowledge creation and sharing project aims.

Active learning is centred on the learner and aims to strengthen personal involvement and ownership of the learning process. It requires interaction between the trainers and the participants and amongst participants. B-WaterSmart embraces this approach in delivering the training actions.

This guide explains how to design effective face-to-face and online training actions to maximise project impact and is structured around a generic topic, adaptable for other topics.

This guidance document is meant to help trainers to plan, deliver and continuously improving the training activities. It supports the improvement of knowledge accessibility and uptake by the participants, including a list of set-up requirements, key content points to convey in the training sessions, and instructions on when to use specific visual aids.

A2 Initial concepts

Through Work Package 1—Co-create & Demonstrate Systemic Innovation in Six Living Labs, B-WaterSmart aims to ensure that the six LLs involved in the project are trained to use the project products relevant to their specific current or intended context and to optimise their value.

Training and education actions aim to ensure the acquisition of skills in water-smart solutions and products and the creation and sharing of knowledge. The trainer has many tools and techniques at his or her disposal to design effective face-to-face and online training courses but to create a convincing and solid learning session; some fundamental concepts need to be considered. Not all concepts presented apply to both face-to-face and remote learning.

Adult learning and learning cycle

People have different preferred learning methods, which poses a challenge for anyone delivering training to a group. Each person generally has one or two stronger learning styles; this means people

[1] Bibliography: WMO (2013). *Guidelines for trainers in meteorological, hydrological and climate services*. WMO-No. 1114. WMO: Geneva, Switzerland. <https://training.eumetsat.int/pluginfile.php/14926/mod_folder/content/0/wmo_1114_en.pdf?forcedownload=1, 2022-08-02>

feel more comfortable learning in their preferred style, are less comfortable in their least preferred style, and must work harder to retain knowledge. Below are four descriptions of the learning styles[2] researched and identified by Peter Honey and Alan Mumford. Figure 8 illustrates the four different styles that people use to learn.

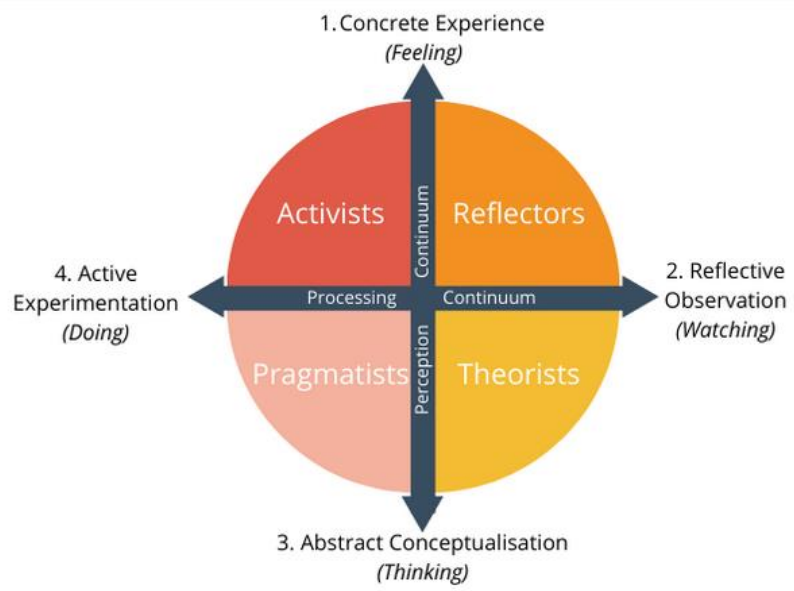


Figure 8: Peter Honey and Alan Mumford Learning styles

The descriptions of the four styles are the following:

Activists

People with this learning preference enjoy working in the present rather than in the past. They want the challenge of games and experiences. They can be motivated by dealing with short-term challenges. Activists will enjoy the challenge of new experiences or learning activities but can become bored by the long reflective or detailed processes and consolidation tasks. Activists are extrovert learners who can be social and gregarious; you can rely on them to contribute to group discussions and exercises.

Reflectors

Like to stand back and think about their experiences and observe them from a range of different perspectives. They collect data and analyse it before coming to any conclusions. Reflectors prefer not to jump to conclusions and can be more cautious than activists. Their learning preference is more introverted, and they might prefer to observe other people in action and take a back seat during training activities and plenary discussions. Reflectors generally like to listen more than talk. This does not mean they are not engaged in the learning process, but they prefer to have notice if they are going to be asked to contribute or express an opinion.

[2] https://expertprogrammanagement.com/2020/10/honey-and-mumford/

Theorists

Are motivated by structured learning based on clear and validated basic assumptions, principles, theories and models. They prefer rationality and logic. In the training environment they tend to be detached and analytical and are unhappy with subjective or ambiguous experiences. They like to assemble disparate facts into coherent theories and make things tidy, fitting them into rational schemes. Theorists are most comfortable with logical and sequential patterns and models they can use to identify where they are and the direction in which they are going. Their logical brain feels most comfortable when they have time to analyse patterns or principles and then apply them.

Pragmatists

Pragmatists are often searching for a solution to a particular problem or issue. They therefore like practical tangible solution-orientated activities and discussions. They positively search out new ideas and take the first opportunity to experiment with applications. These are the sort of people who return from courses brimming with new ideas they want to try out in practice. They respond to problems and opportunities "as a challenge". Pragmatists need to be convinced of the merit or value in an exercise. When they are convinced, they will happily participate.

To understand how to engage with the four different learning styles, trainers need to know the phases of the experiential learning cycle[3] developed by David Kolb and his team and displayed in Figure 9. They recognised that learning is a process and that, to undertake learning, a trainee must complete the process.

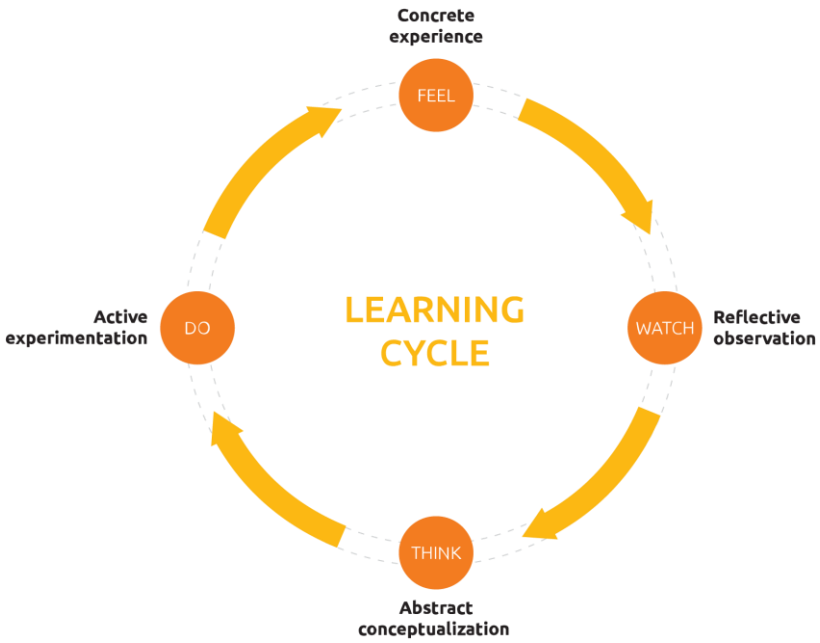


Figure 9: Experiential learning cycle

[3] https://inchainge.com/knowledge/experiential-learning/learning-cycle/

Kolb describes a process that may (i) start with concrete experience, which means trying something out, fully participating and doing things (this is what activist learners enjoy the most). This is often a good starting point as it allows the trainer to validate the experience of the group and assess the levels of knowledge and understanding of the group. However, the experience alone is not enough to say that learning has taken place, and the trainer needs to lead the group into the (ii) second stage, that of reflection. By asking questions, encouraging people to observe and make notes, the reflectors move into their comfort zone and can spend some time reflecting and deciding before they must commit themselves to an idea.

To be able to replicate actions and situations it will (iii) help the group to understand any underlying principles or models that can explain what has happened. This is often a good point to deliver a presentation, as it lends itself to filling the gaps that may have been missed by the group. The final stage is that of (iiii) active experimentation. This provides the chance for the participants but especially the pragmatists in the group to test out if the theories and ideas will work in practice and more importantly (for them) in their situation. So, even within one small part of a training session it is possible to provide the appropriate space and activity for each different learning style which may be present in the group.

Room set – up

The session sheets suggest the most valuable types of room set-up to help trainers prepare the room in advance. Where possible, a “cabaret style” is selected for plenary and small group activities. If it is possible to have a large room, then different layouts may be used to accommodate plenary sessions and small group activities within the same space.

The overall time of the workshop tends to be more than the sum of the activities, normally due to personal interactions and time taken up in the logistics of the movement of participants e.g. coming back from breaks etc. These must be planned for and welcomed: conversations at breaks can be very productive as is the opportunity to network and build new relationships.

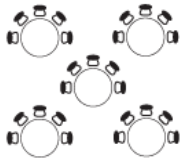
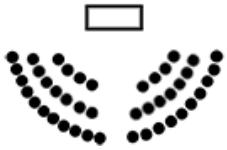
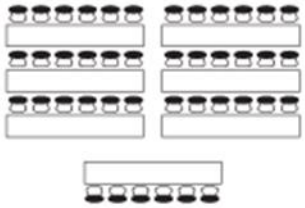
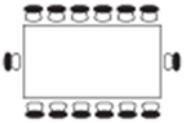
While some of these reasons are a legitimate part of the learning activity and can be beneficial to the group climate, the trainer should take responsibility in keeping times under control, to avoid the risk of poor conclusions, skipped contents, or ending with excessive coverage of the classroom with one-way communication. Visualisation of types of layouts is illustrated in Table 19.

Validation (Learning assessment)

Validation (or learning assessment) answers the questions “Has the training done what we said it would do?”. One of the reasons that the learning objectives are written as outputs is that they become relevant measures in terms of validation.

This use of validation can monitor learner progress which enables the training team to take a snapshot of the progress of the group and identify if any changes need to be made to the programme. The form that is completed at the end of a training event is a validation form with which the trainer could assess if the training reached the goal of knowledge creation and sharing.

Table 19: Examples of room layouts

Cabaret style Sometime called islands. This layout is good for small group discussions/exercises and informal plenary sessions	
Semi-circle style This works well if people do not need to take notes.	
Conference style Not very useful for participatory training.	
Boardroom style Good for role play simulations about meetings. This can be inflexible for group work.	

Evaluation

Evaluation refers to the transfer of learning and the impact/outcome of the training. This cannot be measured at the end of the session, but only after the participants have had an opportunity to implement their learning. Having concrete action plans is a good starting point to measure the impact of the programme. This is measurable by following up participants after the event to measure the impact of the training and identify any direct results.

Concluding considerations

The success of a training session is not just based on providing the technical inputs, but also supporting participants through the learning process. Therefore, the role of the trainer is to offer positive and constructive support and feedback. This requires a balance of empathy and authority. Empathy is to walk in the shoes of the participants, to understand how they feel. Learning does not happen if people feel bored, intimidated, or confused; therefore, the trainer should be confident, positive and kind, to help the participants become successful. Sometimes this requires the skills to manage the group, so agreeing ground rules and ways of being together can help to create and maintain a respectful, warm, and positive creative learning environment.

A3 Planning

A3.1 Training design

In the previous section the concepts of adult learning and the learning process were discussed. These concepts apply to all types of training. In this section we will move on to a more in-depth discussion of specific elements and resources available to the trainer that have been proven to be effective in **technical training** and can be used in and applied to the B-WaterSmart project.

To deliver an effective training for B-WaterSmart products, the main tools trainers should bring to the training room are:

- Trainer's notes
- Session plans
- Session Sheets
- Task sheets
- Handouts
- Technical Notes

When developing the tools listed above, it's essential to consider the key components related to their structure, such as Key Messages, Learning Objectives, Equipment and Room Arrangements, as well as Activities and their Duration. An overview of the main characteristics of the tools and their components is described below.

Trainer's notes

Trainer's Notes provide step-by-step guidelines to the trainer on how to deliver the training session. Trainers should make sure they are familiar with all the materials using the Trainer's Notes on the topic of the session. It includes instruction on how to use the proposed Session Plans, Session Sheets, Task Sheets developed for the training, indications on how to run the activities scheduled, and suggestions on when to distribute Handouts and Technical Notes. Trainers can also add other material to the materials provided to ensure that the program is tailored to some degree to the audience.

Session plans

Session Plans provide an "at a glance" summary of the session. It is purposely brief, so the trainer can quickly see what is coming up and get a sense of the whole session. A session plan provides information about the subject being explored, the type of activities being used, the learning objective and a list of all the materials and equipment required for the session. On the session plans trainers will see a suggested timing and a reference to the electronic slides to be used during the session.

Session sheet

The next level of detail is provided in the Session Sheet. These sheets provide information about the key messages which should emerge from the session. They also include information such

as a pre session checklist and the materials required from the trainer's box. The session sheets also suggest the most appropriate room set-up for the session. The Key Messages note reminds the trainers to stress or make sure the key learning point is understood, either through the activities or the reflections on the activities.

Task sheets

The Task Sheets help participants clarify the task. This is given out to participants as the task is introduced. It can be especially important if participants are not comfortable asking for clarification. Occasionally, if the activity is short, the task sheets are just projected from the electronic presentation, and it is not necessary to print them.

Handouts

Handouts are takeaway material distributed to participants to give them additional information on a certain topic to facilitate the understanding. They are tailored on the target audience and allow to give emphasis on trainer's messages without generating information overload. Trainers won't remember the details of the training after a long time. With a handout, they have all the important information covered in the training session as a concrete reminder.

Technical notes

In the context of training of trainers, technical notes are detailed documents or resources that provide specific guidance and information to trainers and educators. These notes are designed to support trainers in delivering effective training sessions, courses, or workshops. They offer in-depth insights, explanations, and instructions on various aspects of the training process.

Key messages

Trainers should highlight key messages to the trainee before the start of each session. These Key Messages should be repeated at the end of the session to ensure that learning has taken place. Key Messages are the main points of information you want your audience to hear, understand, and remember; they convey the broad message delivered as an overall guide to keep the focus. Key Messages clarify meaning and provide the takeaway headline of the issue the trainer wants to communicate.

Effective key messages are:

- *Concise*: they should be focused on three to five key messages per topic and kept one to three sentences for each key message; should be read or spoken in 30 seconds or less.
- *Relevant*: trainers should balance what they need to communicate with what the participants need to know.
- *Simple*: the advice is to use easy-to-understand language and avoid jargon and acronyms.
- *Real*: the advice is to use active voice, not passive.
- *Tailored*: they should communicate effectively with different target audiences by adapting language and depth of information

Learning objectives

There are learning objectives[4] for each session. These objectives should be written as outputs and should provide an indication of what the participants are expected to do in each session. It is helpful to identify the Learning Objectives at the beginning of the session or during the summary of each activity. This provides a route map for participants to follow the programme and it enables participants to keep track of their learning progress.

To write sound result-oriented leaning objectives the trainer must consider the complexity of the course content, as well as the learning level of participants. Bloom and his collaborators elaborated a framework for classifying goals in training. *Introductory courses* introduce new concepts and foundational knowledge, therefore, according to Bloom's taxonomy[5], Learning objectives relate to the scope of remembering and understanding as is conceptualised in Figure 10.

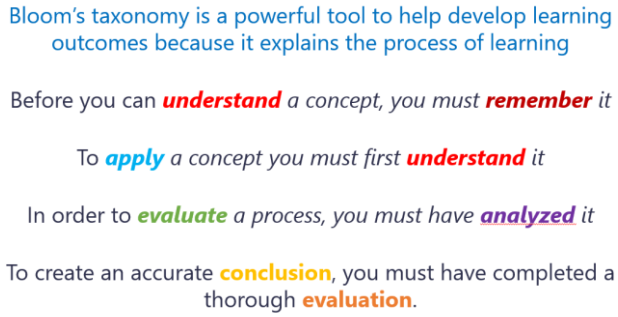


Figure 10: Bloom's Taxonomy rationale

Advanced courses need participants to come to the course prepared with foundational knowledge and being able to use that knowledge to build on it, therefore Learning Objectives can focus on higher levels of learning, such as applying, analysing, evaluating, and creating, depending on the level of learning the participants are expected to achieve.

Learning objectives should start with the stem sentence: "**After completing this module, you will be able to**". Then the trainer should determine the Learning outcome. Learning objectives should be measurable to allow to be measured and assessed. Learning objectives should be observable statements of what participants will be able to do at the end of the unit of learning. Remember to write the verb and Learning outcome into a statement that, combined with the stem, form a complete sentence. Trainers can select the appropriate verb from the Bloom's taxonomy wheel[6] below in Figure 11. The wheel shows the 6 learning goals in the centre, the connected learning activities in the middle, and suggested assessment tools in the external part.

[4] https://www.youtube.com/watch?v=4DgkLV9h69Q
[5] https://tips.uark.edu/using-blooms-taxonomy/
[6] http://reinventenglish.com/the-wheels-of-bloom-go-round-and-round-round-and-round/ep-blooms-wheel/

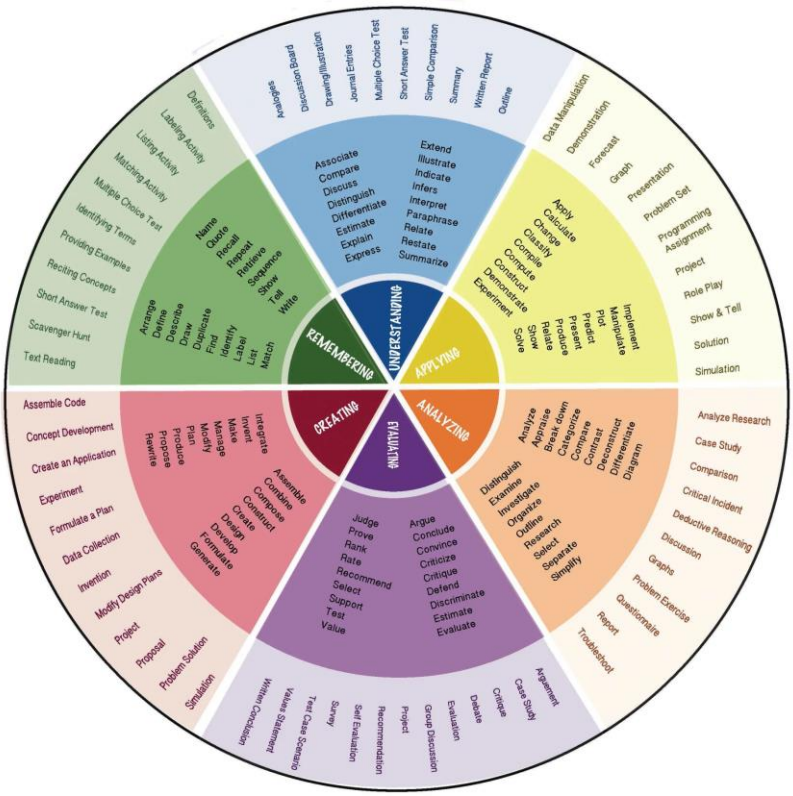


Figure 11: Bloom's Wheel

For ease of reading, trainers may also refer to the following Table 2 that lists Blooms learning objectives associated with potential activities[7]:

Table 10 Learning objectives compass.

Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
define identify label list match name recall recognize record relate repeat select state	classify compile conclude discuss describe explain express give examples identify interpret recognize summarize translate	apply calculate demonstrate develop interpret locate operate perform practice predict present report use	analyse calculate categorize classify compare contrast determine differentiate distinguish examine outline test	arrange assemble compose construct design develop diagnose manage organize plan propose relate summarize	assess compare critique decide determine establish evaluate judge measure rate recommend select

[7] https://www.twinkl.it/teaching-wiki/learning-objective

Equipment and room arrangements

Equipment is a tool that trainers should bring into the room to make learning more effective. Some examples are sticky notes, cards, laptop, projector, markers, printed material, action planning booklet, and so on. Equipment includes the layout of the room, such as the most effective table arrangement suggested for each learning session or activity.

Activities and duration

Below is a list of learning activities that could be carried out during the learning sessions, they are provided with the aim and objective to help the trainer to choose the most effective one depending on the topic and learning goals[8].

- Application exercise - identify steps or actions to use in learners' own environment.
- Case study - identify concepts and skills in a specific environment; apply knowledge.
- Demonstration - observe skills in action, usually by instructor or experienced performer.
- Discussion - draw on learner's experience; encourage application; identify challenges and obstacles.
- Fishbowl - observe skills in action; provide feedback.
- Games & simulations - discover learners' habitual tendencies; establish a need to change; experience and analyse underlying issues; practice skills.
- Lecturette - introduce new area of content; convey conceptual, historical or theoretical information.
- Pen & paper exercise - identify concepts and knowledge, practice and test knowledge.
- Personal Reflection - create awareness of concept; encourage learner's emotional involvement.
- Reading/ self-study - introduce new area of content; gain broader background on topic.
- Role play - establish the need to change, practice skills in a work-related context.
- Video clip - provide information; set a mood; demonstrate interaction.
- Visualization - engage learners' imagination.

For each activity the duration should be indicated, this to help the trainer to maintain the right pace of the training session and to avoid the risk of accumulating delays, which would mean having to present the next topics in a hurry or even having to skip sessions.

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[8] United Nations SIAP, Statistical Institute for Asia and the Pacific, February 2016 TRAIN-THE-TRAINER MANUAL Checklists, Guidelines and Templates for Active-Learning Workshops; https://www.unsiap.or.jp/tnetwork/1703_TOT/ToTManual.pdf

Opening words and introductions

The first session of the event usually opens with a few welcoming words and speeches. During the introduction the trainer should outline the topics that will be discussed during the session. It is important to set the tone of the learning event in this first part to encourage active participation.

After any official speeches, the trainer introduces the learning event and the route map so that participants can visualize what will happen over the day. The trainer should be sure to contextualize the discussion to audience as much as possible to make sure that participants feel it is directly relevant to them.

Ice-breaker activities

The icebreaker allows participants to meet each other and to discuss their expectations for the course. For B-WaterSmart training session we suggest separating participants into groups, so that participants can introduce themselves to each other and share their expectations for the training. One person from each group should feedback the conversation in plenary. The trainer should link the feedback to the agenda and the course objectives and be clear about how those expectations can be met throughout the week. It is also important to acknowledge openly what will and will not be discussed.

Group activities and pair activities

Group activity should provide a good basis upon which to begin discussing the proposed topic of the session. However, the trainer should be prepared to provide some input and work with groups who have less knowledge, providing them with any necessary context.

The trainer could encourage working in groups with subsequent comparison in the plenary of the different points of view.

The size of the group should allow an appropriate balance of the following needs:

- Each participant should have sufficient time to contribute to the discussion, provide facts and share personal experiences.
- The groups and the plenary need to consider facts, discuss the inputs, elaborate output, and agree on results.
- The activities should not be too long to be boring, nor too short to be a rushed; the group dynamics should be respected, and a reasonable time should be given for drawing conclusions.

In participative training activities it is important to check out how participants are feeling both in terms of content and of learning processes and be willing to adapt them based on the feedback received.

Plenary feedback and plenary discussion

During the plenary feedback, the trainer should highlight the shared ideas and, if there is time, where the ideas are not clear ask for clarification. To conduct this activity, the trainer can read the ideas and definitions back to the participants. After summarising the results of the activity, the trainer can ask the

groups to share some of the highlights of their conversations. The trainer should be ready to provide further clarification, highlight key messages and ensure that any gaps have been filled. To make sure this happens smoothly the trainer should be provided with technical notes, additional information and supporting documents for the knowledge base.

Wrap up

The final part of any final session should be dedicated to a short summary from the trainer about the day's learning, instruct participants to use their workshop notes and to think about how to apply their learning within their organisations.

A3.2 Session plans

In the previous section, delivery tools available to B-WaterSmart trainers to lead effective trainings, such as how to convey sound key messages and how to write effective lessons learned, were presented. Going one step further, this section presents an important tool for the trainer, the Session Plan. **Session Plans aim at providing the trainer with an "at a glance" summary of the day to quickly see what is coming up and get a sense of the whole session. Session Plans consist of indications of the suggested activities, Learning Objectives and suggested equipment for all the sessions of the day in one page**. This tool is meant for the trainer's use and typically it is not distributed to attendees.

In Table 11 an example of the session plans addressing a generic topic is provided. The training day is built around two working sessions, for each session leaning objectives, activities, timing, duration, and room equipment are suggested. The tool can be used as a template for all the topics of B-WaterSmart project.

The first session (Session 1) should focus on breaking the ice and sharing experience, while the second part of the training (Session 2) should be more practical.

Table 11: Example of a session plan

[Title of the training]			
Session Plan	**Suggested activities**	**Learning Objectives**	**Equipment**
Session 1 **9.00-10.30** ***[Title of the Topic]*** **Topic 1**	*[The trainer starts the training day with opening words and the icebreaker activity if needed]* **Opening words**, introductions, and expectations to set the scene for the learning event (e.g.,30'). **Icebreaker activity**: for introductions and expectations (e.g.,15') **(OPTIONAL)** *[The initial speech might be followed by one or more of the following activities]* **Activity**: Definitions: participants work in groups to ... and share their experiences (e.g., 20'). **Plenary feedback**: Summarize the definitions, inquire about some highlights of the group conversations, and have a conversation about the BWS product or solution. (e.g.,15'). **Trainer input** to fill in the gaps and highlight key messages (e.g.,10').	*[The trainer lists the Learning Objectives of Session 1]* Set the scene for the learning event Categorised... Compared ...	*[The trainer lists the equipment needed for Session 1, including the material to distribute]* e.g., A5 Cards e.g., Felt-tip pens ... Task sheet: ... Handout: ... Technical Note: ...
Coffee Break			
Session 2 **11.00-12.30** ***[Title of the Topic]*** **Topic 2**	*[Session 2 should focus on more practical activities, e.g.:]* **Trainer input:** on BWS product or solution (10'). **Activity**: Small groups carry out the planned activity (30'). **And Trainer feedback** (10'). **Plenary discussion** on BWS product or solution (30'). **Action planning and wrap-up of Day 1** (20').	*[The trainer lists the Learning Objectives of Session 2]* Examined... Tested...	*[The trainer lists the equipment needed for Session 2, including the material to distribute]* Task sheet: Technical note: Handout: Video: link Case study: …

A3.3 Session sheets

Another valuable tool that trainers should bring to the training room is the session sheet. this section offers guidance on how to prepare this tool effectively. a session sheet includes detailed instructions for each training session, covering key messages, objectives, equipment and room arrangements, activities and durations, including the list of task sheets, handouts, and additional resources. they provide a higher level of detail compared to the session plans. this tool is meant for the trainer's use and typically it is not distributed to attendees.

Figure 12 illustrates the portion of the session plan that is expanded to create the session sheet for session 1. this process should also be replicated for subsequent sessions. Table 12 provides a visual representation of what the session sheet looks like.

[Title of the training]			
Session Plan	**Suggested activities**	**Learning Objectives**	**Equipment**
Session 1 **9.00-10.30** ***[Title of the Topic]*** **Topic 1**	*[The trainer starts the training day with opening words and the icebreaker activity if needed]* **Opening words**, introductions, and expectations to set the scene for the learning event (e.g.,30'). **Icebreaker activity**: for introductions and expectations (e.g.,15') **(OPTIONAL)** *[The initial speech might be followed by one or more of the following activities]* **Activity**: Definitions: participants work in groups to ... and share their experiences (e.g., 20'). **Plenary feedback**: Summarize the definitions, inquire about some highlights of the group conversations, and have a conversation about the BWS product or solution. (e.g.,15'). **Trainer input** to fill in the gaps and highlight key messages (e.g.,10').	*[The trainer lists the Learning Objectives of Session 1]* Set the scene for the learning event Categorised... Compared ...	*[The trainer lists the equipment needed for Session 1, including the material to distribute]* e.g., A5 Cards e.g., Felt-tip pens ... Task sheet: ... Handout: ... Technical Note: ...
Coffee Break			
Session 2 **11.00-12.30** ***[Title of the Topic]*** **Topic 2**	*[Session 2 should focus on more practical activities, e.g.:]* **Trainer input:** on BWS product or solution (10'). **Activity**: Small groups carry out the planned activity (30'). **And Trainer feedback** (10'). **Plenary discussion** on BWS product or solution (30'). **Action planning and wrap-up of Day 1** (20').	*[The trainer lists the Learning Objectives of Session 2]* Examined... Tested...	*[The trainer lists the equipment needed for Session 2, including the material to distribute]* Task sheet: Technical note: Handout: Video: link Case study: ...

Figure 12: Session plan detail

Table 12: Example of a session sheet

[Title of the training]		
Session Sheet		***[Session 1 title]***
Key messages	The session aims at showcasing the BWS product or solution [name].	
Learning Objectives	*[Take Learning Objectives from the Session Sheet]* By the end of this session, participants will have: - Set the scene for the learning event. - Categorised … - Compared …	
Equipment & Room Arrangement	*[e.g. take this information from the Session Sheet]* Projector and screen, laptop/computer, flipcharts, marker pens. The classroom should be set up in 'islands' or 'cabaret style' for the group work. For the first activity, you will need e.g. A5 cards and e.g., a whiteboards/pin board.	
Activity And Duration (Total: 1.5 hours)	30'	**Opening words, introductions and expectations** to set the scene for the learning event.
	15'	**Icebreaker activity** for introductions and expectations.
	20'	**Activity: Definitions** Participants work in groups to define… and share their experiences.
	15'	**Plenary feedback:** Summarize the definitions, inquire about some highlights from the group and have a conversation about BWS product or solution.
	10'	**Trainer input** to fill in the gaps and highlight key messages regarding BWS product or solution.
Task Sheets & Handouts	*[e.g. take this information from the Session Sheet]* Task sheet: … Handout:.. To distribute: …	
Additional Resources for the Trainer	Technical Notes:	

A3.4 Task Sheets

Taking a step toward greater detail, we have the task sheets. task sheets provide comprehensive instructions for participants, guiding them through activities proposed by the trainer. these sheets offer a step-by-step guide, serving as a valuable tool for participants to navigate the activity smoothly. distributing task sheets to participants when introducing a task, particularly for group activities during the sessions, is advisable.

Figure 13 illustrates the portion of the session sheet that is expanded to create the task sheets for each activity. Figure 14 offers a visual representation of a task sheet for the ice-break activity. this process should also be replicated for subsequent activities.

[Title of the training]		
Session Sheet		***[Session 1 title]***
Key messages	The session aims at showcasing the BWS product or solution [name].	
Learning Objectives	*[Take Learning Objectives from the Session Sheet]* By the end of this session, participants will have: - Set the scene for the learning event. - Categorised … - Compared …	
Equipment & Room Arrangement	*[e.g. take this information from the Session Sheet]* Projector and screen, laptop/computer, flipcharts, marker pens. The classroom should be set up in 'islands' or 'cabaret style' for the group work. For the first activity, you will need e.g. A5 cards and e.g., a whiteboards/pin board.	
Activity And Duration (Total: 1.5 hours)	30'	**Opening words, introductions and expectations** to set the scene for the learning event.
	15'	**Icebreaker activity** for introductions and expectations.
	20'	**Activity: Definitions** Participants work in groups to define… and share their experiences.
	15'	**Plenary feedback:** Summarize the definitions, inquire about some highlights from the group and have a conversation about BWS product or solution.
	10'	**Trainer input** to fill in the gaps and highlight key messages regarding BWS product or solution.
Task Sheets & Handouts	*[e.g. take this information from the Session Sheet]* Task sheet: … Handout:.. To distribute: …	
Additional Resources for the Trainer	Technical Notes:	

Figure 13: Task sheet detail

<table>
<tr><th colspan="3">[Title of the training]</th></tr>
<tr><td>Task Sheet</td><td colspan="2">Ice-break activity</td></tr>
<tr><td>Part 1</td><td> 
</td><td>In your groups, start by introducing yourselves.
- What is your name?
- Where are you from?
- What do you do?</td></tr>
<tr><td>Part 2</td><td>Your group has been assigned one of the following
-
-
-
Work together to generate as many concepts or ideas …

Draw upon your own experiences and knowledge at the table …

Here are the questions your groups should answer:

- Provide tips to participants…</td><td>  </td></tr>
<tr><td>Instructions</td><td colspan="2">Please use a marker pen to write up the cards and hand them in as they are being developed, so the trainers can start to organise and identify emerging themes from each small group. The rule about using cards is one idea per card, but as many cards as you wish.</td></tr>
<tr><td>Time bounds</td><td>  </td><td>You have 10 minutes to complete part one and a further 5 minutes to complete part two. Be ready to share your ideas in the plenary session.</td></tr>
</table>

Figure 14: Example of task sheet

Once these tools are prepared, they can be introduced into the training room to enhance the overall training experience. In the forthcoming sections, we will delve into tools specifically designed to facilitate the participants' learning process.

A3.5 Handouts

To keep the learning process effective, trainers can rely on **supporting material to distribute during the training sessions.** Handouts are written material containing topical information distributed to participants to give them additional information on a certain topic. Handouts facilitate the audience's understanding of the issue, providing deeper knowledge and relevant information. They allow participants to focus more on what the trainer says during the presentation and serve as a tangible reminder of the content afterwards.

Handouts are usually a good tool to make sure the contents of an oral presentation can be reviewed by the audience after the presentation. It helps the audience focusing on listening rather than taking notes. For a good presentation, a handout should be prepared including further reading material and weblinks.

To be effective, a good handout should:

- Support the purpose of the presentation.
- Be an integral part of the presentation.
- Support the audience's future use of the presentation.
- Package the information from the perspective of the audience or user.
- Sift and focus the information.
- Be simple, especially when it's being used as a presentation aid.
- Don’t include unnecessary detail.
- Keep the focus on a single topic.
- Considers the visual impact.

Examples of useful handouts are:

- Case studies
- Worksheets
- Information sheets
- Audio-visual aids
- Slides
- Activities

A3.6 Technical notes

Technical notes provide additional information on the training topic, and any additional information should be considered to help the trainer gain a deeper understanding of the topic. This additional information should be distributed and shared with participants. Technical notes may cover definitions, procedures, technical product information, test results, etc.

In the context of training, usually technical notes might include:

- Content, methodologies, and strategies covering various aspects of the training program
- Step-by-step instructions on how to conduct specific activities or tasks
- Background information and context
- Practical examples, scenarios, or case studies to illustrate key concepts
- Best practices
- Tips, guidelines, and recommendations
- References to additional resources, readings, or tools

A4 Delivery

A4.1 Trainer's notes

Trainer's notes provide step-by-step guidelines for the trainer on how to deliver the training session. The guidance is completed with session plans, session sheets, activities, and suggestions on how to deliver them, detailed task sheets and relevant handout to ensure maximising the impact of the learning sessions. Created to support trainers and educators in delivering effective training sessions, Trainer's Notes serve as a guide and reference tool, providing valuable information, instructions, and insights necessary for successful training delivery.

Trainer notes are a fundamental resource for trainers, providing them with the structure, content, and strategies needed to deliver successful training programs. They are designed to ensure consistency, effectiveness, and a positive learning experience for participants. Trainer Notes usually include:

- Detailed content that covers the training program's objectives, curriculum, and specific topics.
- Structured lesson plans with clearly defined learning objectives, content, activities, and time allocations.
- Guidance on effective teaching strategies and methodologies tailored to the training content and audience.
- A list of required resources, such as materials, equipment, and references, needed for each training session.
- A schedule or timeline for each training session, indicating when to start and end specific activities.
- Information on how to assess and evaluate participants' progress
- Elements to engage and interact with participants, including discussion prompts, group activities, and hands-on exercises.
- Guidance on fostering participant engagement, motivation, and active participation.
- Advice on how to handle common challenges or issues that may arise during training sessions.
- Practical tips and best practices for effective training delivery are often included.
- Suggestions on the use of visual aids and multimedia.
- Guidance on providing support to participants, including addressing questions and concerns.

Trainer's notes might also include session slides printed in notes mode, 3 slides per page. Trainer's notes are not shared and distributed with participants as they are designed to support trainer activities.

A4.2 Training evaluation and continuous improvement

To measure the success of the BWS training an evaluation can be conducted through a survey. The evaluation of results enables to implement changes to the training sessions to improve their effectiveness as well as draw overall lessons and identify best practices addressing all relevant aspects related to a sound and effective training experience.

Participant might be asked:

Please rate the extent to which you agree with each of the following statements from 1 - 5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

Some questions that might be asked to participants relate the **program objectives**:

- The program objectives were clearly defined.
- The program objectives were covered by the facilitator.

Other questions might relate **course content and relevance**:

- The course was well organized.
- The course materials were well organized.
- The course materials help support the course objectives.
- The course activities were well designed.

It might be assessed also the **facilitators knowledge and effectiveness**:

- The facilitator demonstrated a good understanding and effectively delivered the program material.
- The facilitator shared his/her experiences with the participants to be able to relate to the content being discussed.
- The facilitator did a good job of generating participant interaction while keeping it a safe learning environment.
- The pace of the program was good.
- The duration of the learning session was appropriate for the content objectives and complexity.
- The breaks were spaced at the right times during the session(s).
- The trainer facilitated the workshop effectively.

To avoid duplicating efforts, these additional questions can be asked at the same time as the learning assessment, to provide participants with one single questionnaire.

A5 Assessment of training performance

Chapter 5 presents the planned assessment steps of the training activities and their contribution to key performance indicators.

A useful tool to assess whether the training has achieved learning transfer is by sharing a questionnaire at the end of the training event though an Assessment Form. A training feedback form is a tool used to evaluate training sessions by gathering feedback from the participants regarding the training program – if the programme has been clearly defined – and regarding the contents – if contents were relevant for the participants. A questionnaire suited for B-WaterSmart products is provided in Table 13, at the end of this section.

According to Kirkpatrick's Model there are 4 levels of success[9] for the learning interventions as depicted in Figure 15. They are reaction, learning, behaviour, and results.

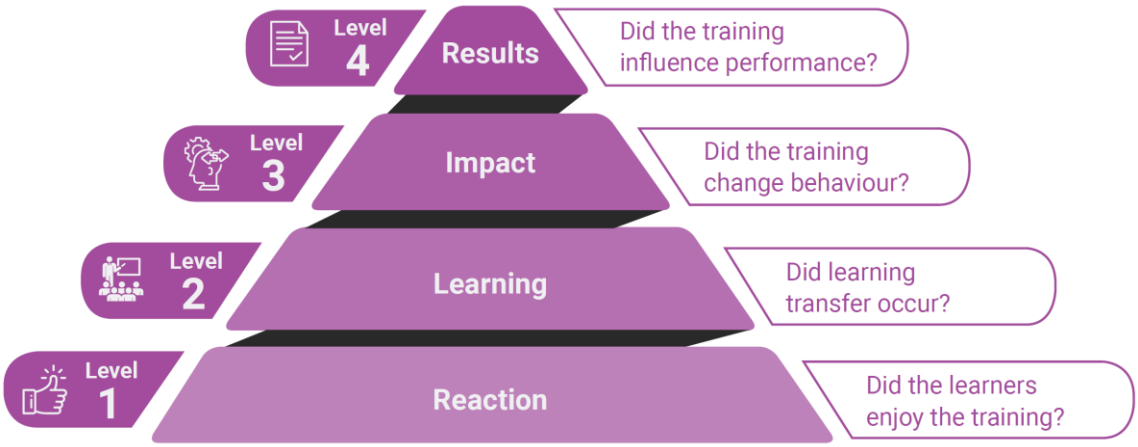

Figure 15: Levels of training evaluation

Each level answers a specific question:

1. *Reaction.* Did the learners like the experience and did they find it useful and enjoyable?
2. *Learning.* Did the learners achieve the learning objectives that were set?
3. *Behaviour/Impact.* Are the learners able to apply their learning in the world?
4. *Results.* Were the outcomes achieved valuable to the organization and individual? (cost/benefit analysis)

The learning interventions within BWS are designed to achieve success at the Reaction, Learning, and Behaviour/Impact levels.

[9] https://kodosurvey.com/blog/how-master-kirkpatrick-model-training-evaluation

Reaction

The course evaluation is based on the feedback collected by the trainer at the end of the training day. Participants are asked to fill a feedback questionnaire scoring their answers from 1 (strongly disagree) to 5 (strongly agree). Other scores are 2 (disagree), 3 (neutral) and 4 (agree). The following list provides examples[10] of effective questions for gathering valuable feedback to extract lessons learned. This checklist serves to ensure that training programs are well-defined, and their contents remain relevant.

1. I was able to achieve the course objectives.
2. The course was interesting.
3. The course provided me with practical information.
4. The material was the right level of complexity for my background.
5. The content was relevant to my needs.
6. The course materials helped me in my learning.
7. Overall, the course was well worth the time that I spent in it

To gather additional information from the audience, **open question**s can be added to the form.

8. What did you like the most about the learning session/s?
9. What do you think needs to be changed or improved?
10. Please share your final thoughts on the learning session/s

Learning

An effective method of assessing the achievement of learning objectives during the training is by conducting pre- and post-workshop tests. A pre-test (diagnosis test) is given to diagnose level of knowledge/skills of learners on the topics covered. After completing the training, post-test can be conducted to assess the level of progress in each learner by measuring difference between participant scores in post and pre-tests. It is critical to remember that the post-test must contain different questions from the pre-test, but with the same level of difficulty and same number of questions on each topic.

Behaviour or impact

Despite difficulties in assessing the long-term organisational and individual impact of training, many training providers attempt to understand the extent to which the learning is being applied in the field. Follow-up surveys are simple methods that may be used to assess to what extent knowledge and skills learned during training activities were applied in real work. A method of assessment is through action plans developed during the training sessions. Participants may be asked to develop an action plan which they wish to implement upon return to their organisations. Follow-up surveys will focus on implementation of the action plans.

To complement the development of the action plans, participants might be asked to rate to which extent the course inspired them to take follow-up action in their own organisations.

[10] https://public-library.safetyculture.io/products/training-feedback-form

Table 13: Example of assessment Form

Assessment Form	
Please rate the extent to which you agree with each of the following statements from 1 – 5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	
I was able to achieve the course objectives	
The course was interesting	
The course provided me with practical information	
The material was the right level of complexity for my background	
The content was relevant to my needs	
The course materials helped me in my learning	
Overall, the course was well worth the time that I spent in it	
The program objectives were clearly defined	
The program objectives were covered by the facilitator	
The course was well organized	
The course materials were well organized	
The course materials help support the course objectives	
The course activities were well designed	
The facilitator demonstrated a good understanding and effectively delivered the program material	
The facilitator shared his/her experiences with the participants to be able to relate to the content being discussed	
The facilitator did a good job of generating participant interaction while keeping it a safe learning environment	
The pace of the program was good	
The duration of the learning session was appropriate for the content objectives and complexity	
The breaks were spaced at the right times during the session(s)	
The trainer facilitated the workshop effectively	
What did you like the most about the learning session/s?	
What do you think needs to be changed or improved?	
Please share your final thoughts on the learning session/s	

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