

COMMUNITIES OF PRACTICE REPORT #1

Documentation of events and achievements

Deliverable N° 5.2 Communities of Practice report #1

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Abstract

This report documents the activities and progress of the five local Communities of Practice (CoP) and the project CoP in DWC.

The first section describes the different CoPs operating in DWC including their key aims and goals.

The second section reports the activities carried out and the progress achieved in the five local CoPs (i.e. DWC Berlin, DWC Copenhagen, DWC Milan, DWC Paris and DWC Sofia). Then, the two events organized for the Intra-Project CoP in the initial 18 months are documented.

Finally, four annexes provide support information, which has been shared with the CoP leaders to facilitate the setting up and operation of the CoPs.

Dissemination level of the document

<input checked="" type="checkbox"/>	PU	Public
<input type="checkbox"/>	PP	Restricted to other programme participants
<input type="checkbox"/>	RE	Restricted to a group specified by the consortium
<input type="checkbox"/>	CO	Confidential, only for members of the consortium

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Note that previous version to *V* are draft since they are not yet approved by the EC.

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Executive summary

In DWC, the Communities of Practice are composed by stakeholders from a variety of background, fields and expertise with the common objective to contribute to the development of digital solutions and facilitate their local uptake. DWC brings together project partners and external stakeholders in the frame of a 3-tiered scheme of CoPs: i) at **local level** (city scale); ii) at **intra-project level** (mutual learning and knowledge exchange between the cities’ stakeholders) and iii) (3) at **trans-project level**.

This report describes the activities undertaken by the five local CoPs and the intra-project CoP throughout the initial 18 months of the project. The annexes include the guidelines elaborated to facilitate the setting up and operation of the events.

1. THE “COMMUNITIES OF PRACTICE” IN DWC

1.1. The concept of Communities of Practice in DWC

By Community of Practice (CoP) we mean “a group of significant and diverse stakeholders that may be relevant to address an issue and may be available to share and join experiences, skills, ideas, resources, actions to go further embracing shared collective and societal challenges”¹. Most importantly, it must be kept in mind that a CoP is a dynamic learning process and a living collective body that is expected to evolve by trust building among partners and common achievements.

In DWC, the Communities of Practice are composed by stakeholders from a variety of background, fields and expertise with the common objective to contribute to the development of digital solutions and facilitate their local uptake. The network meets regularly in the frame of COP meetings/workshops and provides input, feedback and support for the development and testing of innovations. These local networks of organizations and individuals combine business, policy and management sectors, focused on bringing new products, new processes and new forms of organization towards the market.

In DWC, the establishment of Communities of Practice is the binding element (our DWC “cement”) to achieve a truly interdisciplinary and transdisciplinary approach through the integration of scientific research from several disciplines with non-academic and non-formalized knowledge. This implies that CoPs may take part both in the formulation of the objectives and in the expected outcomes.

In particular, the DWC CoPs will build on this approach **to support the development of the digital solutions and facilitate their adoption** by relevant stakeholders and the society (“DWC challenge”). DWC will bring together project partners and external stakeholders in the frame of a 3-tiered scheme of CoPs:

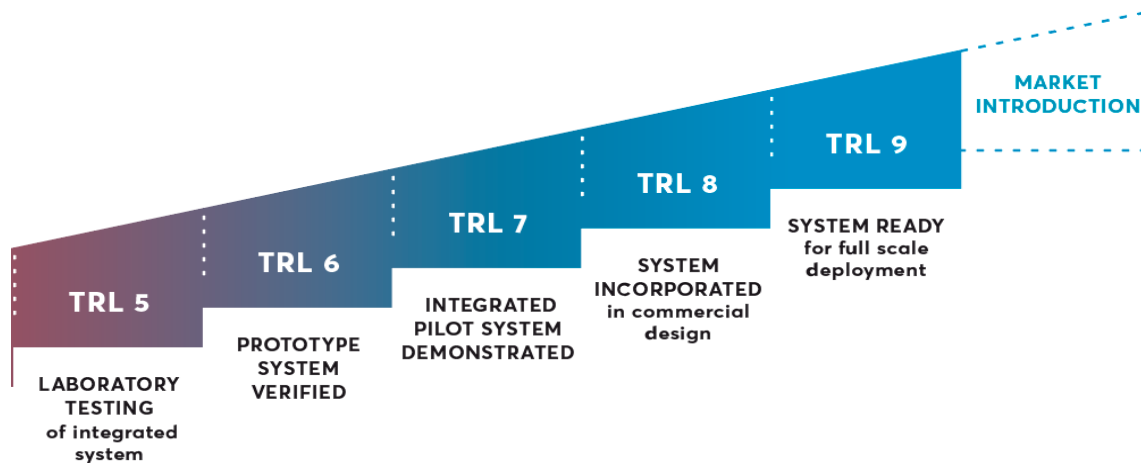
- (1) **At local level** (city scale), the five local CoPs (one in each city) are expected to accelerate internal innovation by integrating stakeholder knowledge in product development and building the trust of external stakeholders in the future use of the digital solutions.
- (2) **At intra-project level**, one CoP provides mutual learning and knowledge exchange between the cities’ stakeholders regarding:
 - The transferability of the digital solutions (i.e. the ability to adopt in a given city successful measures previously adopted elsewhere, and achieve comparable results)
 - Common issues linked to digitalization such as interoperability and cybersecurity
- (3) **At trans-project level**, one CoP enables knowledge transfer between DWC and other projects, networks and institutions. The trans-project CoP is an instrument to support market and policy uptake and link DWC to relevant European entities such as standardization bodies.

¹ Definition extracted from the “Guidelines designed to create, feed and enhance “win-win” collaborations between researchers and stakeholders” produced by H2020 BINGO project.

OUR CHALLENGE

European cities face major challenges to achieve the desired level of sustainability in the management of urban water, and innovative (digital) solutions are often needed. However...

- ✓ There is often a low level of maturity of digital solutions regarding standardization, interoperability, cybersecurity and governance aspects
- ✓ There is a lack of tangible evidence of the benefits provided by digital solutions at each management level across the water value chain
- ✓ Promising innovations do often fail to reach the market. (The gap from TRL5-6 – ‘tested pilot’ to TRL9 – ‘market ready’-, is often referred as the ‘Valley of Death’). This is often due to a lack of an integrated market, social and technical readiness and misalignment with end-users’ concrete expectations and needs.



1.2. Introducing DWC local CoPs

The role of the local CoPs in DWC goes beyond a traditional approach where non-researchers are given an inactive role, i.e. merely considered as “data-providers” and/or “end-users”. The local CoPs aim at

- Creating a long-term collaborative environment at the city level,
- Increasing the knowledge exchange between local stakeholders,
- Supporting the integration of stakeholder knowledge and expectations into the development of the solutions,
- Building the trust of external stakeholders in the future use of the solutions.

This approach aims to achieve a “win-win” collaboration to overcome the barriers from innovation to practice where:

- ✓ Innovators benefit from direct support for testing and/or implementing digital solutions in practical contexts, raise the interest of external stakeholders for the benefits provided by their solutions, and start building trust in the use of the digital solutions.
- ✓ Innovators receive accurate requirements and particular needs from users identified throughout the final stages of development. This is particularly relevant since innovations may tend to focus on the technical aspects and partially neglect the consideration of issues

or difficulties related to end-users' daily routines, as well as issues related to social acceptance of the final solutions or tools.

Local CoPs are organized in the five DWC cities, i.e. Berlin, Copenhagen, Milan, Paris and Sofia. Figure 1 provides an overview of the solutions to be implemented in each of these cities, which are also described in detail in the plan for exploitation of DWC results (i.e. deliverable 5.1). Each local CoP is managed by a city leader (see Table 1).

Table 1. Local CoP leaders, key challenges, and planned activities in each city

CITIES	"CITY LEADER"	KEY CHALLENGES	DEMO ACTIVITIES IN CITIES
BERLIN	BWB (public utility) Responsible for drinking water supply and wastewater disposal for the 3.5 million inhabitants of Berlin	In Berlin, the urban water cycle is partially closed and intensively challenged by competing uses and pressures. Hence, minimizing river impacts and increasing the efficiency of the existing infrastructure are major goals in integrated water management	Improved operation and predictive maintenance of water wells / Public awareness (groundwater management) / Identification of illicit connections in the stormwater network / Real-time stormwater management
PARIS	SIAAP (public body) SIAAP is responsible for the compliance with the sanitation regulation in the Greater Paris	Water bathing quality. Legacy of the Olympics and Paralympic games 2024	Bathing quality (including public awareness)
COPENHAGEN	BIOFOS (publicly owned water utility) BIOFOS takes care of the wastewater treatment in Copenhagen	Stormwater real-time control. This is hampered by the lack of accuracy of WWTP in flow forecast and the lack of interoperability between BIOFOS and HOFOR data management systems	Sewer and WWTP management
MILAN	CAP (publicly owned water utility) It deals with the Integrated Water Service within the Great Milano Area	Safe water reuse for irrigation. Also, monitoring of irrigation efficiency and public awareness on the importance of the Water-Energy-Food nexus	Safe water reuse for irrigation
SOFIA	SV (water utility company) Provides water and wastewater services to Sofia.	Increasing sewer maintenance efficiency, as a key issue to reduce blockages and flooded properties, increase customer satisfaction, and meet the requirements to prevent overflows in dry weather	Sewer and stormwater management



Figure 1. Digital-water.city solutions

The responsibilities of the city leaders include the invitation of stakeholders to participate in meetings and other activities, the preparation of the venue and agenda for the local meetings, the moderation and facilitation of meetings, and the elaboration of minutes and reporting on main issues, learnings, action points, and achievements.

The city leaders are supported by I-CATALIST (ICA - as leader of task 5.1 related to CoP's activity in DWC) and KWB (as project coordinator) through the provision of guidelines and ancillary materials as well as through direct support to the organization of specific activities when needed. ICA is also responsible of facilitating an appropriate coordination of the activities undertaken in the different cities.

Local CoPs are expected to convene at least twice per year, although in some cases, this is not expected to happen for the initial two years of the project (e.g. when stakeholder involvement is not so relevant for the initial stages of development of the digital solutions and it is preferred to wait for engaging with the relevant stakeholders until some preliminary results are available).

To facilitate the understanding of the concept by the local community of stakeholders, local CoPs are usually referred to DWC events. For example, in Berlin the CoP meetings are publicly called "DWC Berlin" events. The term CoP can sound too academic and create additional complexity in the communication process with the stakeholders.

As a summary, the DWC Communities of Practice (CoPs) aim to address our challenge by facilitating the engagement of

- 'researchers' (innovators / research centres) and
- 'non-researchers' (water utilities / public management bodies / civil society)

to support the CO-DEVELOPMENT of digital solutions.



1.3. Introducing DWC project CoP

The project CoP provides a tool to facilitate knowledge exchange across the DWC cities (i.e. with a focus on mutual learning) and between the DWC cities and the technical work packages (with a focus on cross-fertilization).

In terms of mutual learning, cities can exchange their experiences regarding the development of the DWC digital solutions, while comparing these innovations to current solutions used to deal with similar problems. The goal of these activities is to identify drivers, constraints, and barriers for the adoption of novel digital solutions. This work helps to highlight key transferability issues for the successful uptake of the solutions in a different context. Key aspects to be addressed include reflecting on the outcomes of the local demonstration: what worked well (key drivers), what were the issues of implementation (main barriers and drawbacks), what could have been done differently, and what would be considered for replication in another setting.

In terms of cross-fertilization, the project CoP provides a space for discussion around the transversal topics addressed by DWC, e.g. cyber-security, interoperability, digital governance, where technical partners and DWC cities can meet.

The project CoP is facilitated by ICA (as leader of task 5.1) and KWB (as project coordinator). In general, the project CoP meetings will take place in coincidence with other project meetings, e.g. General Assembly or WP technical meetings, taking advantage of the organization of a larger meeting where many of the project CoP members are also attending. Project CoP is expected to convene once a year in the initial two years of the project, and at least twice per year in the final two years.

1.4. Introducing DWC trans-project CoP

DWC has foreseen a specific CoP focusing on networking and clustering activities with other projects and related actions. This has been embedded into a new initiative, i.e. DigitalWater2020, which is led by KWB (as project coordinator). The goal is to identify and take advantage of synergies and complementarities with five sister projects funded under H2020. This is addressed through four task forces for (1) ontology, (2) sensors, (3) market and (4) communication, one of them (market uptake) coordinated by a DWC partner (Ecologic Institute). The active participation of DWC members in this initiative will facilitate the networking activity of DWC local and project CoPs.

The activity of DWC in DigitalWater2020 is reported extensively in a dedicated deliverable².

² DWC Deliverable 7.5, 2020, Synergies inside the portfolio of SC05-11-2018 projects

2. ACTIVITY OF DWC LOCAL COPs

2.1. Influence of Covid 19 pandemic

The unexpected crisis produced by the Covid-19 pandemic from February 2020 has affected the planned calendar of activities for the local CoPs, although a significant effort has been made to mitigate and minimize this impact.

Planned activities in some cities, e.g. Milan, Copenhagen and Sofia, for March-May 2020 had to be called off because of the entering into force of health protection measures and lockdown situations, and support to cities in the organization of events through travels and physical meetings was reduced. However, the consortium has managed to reschedule the cancelled activities while transforming these into digital online events, and participation in these activities has been even higher than the anticipated participation for the face to face meetings.

The main registered impact on the project is a delay in the elaboration of clear roadmaps of activities for the local CoPs, but in general terms, this does not seriously affect the role of local CoPs in the project, nor the contributions to the co-development of the digital solutions. Also, getting an active participation of stakeholders is more challenging in online meetings. This is being addressed through the use of specific online software tools (e.g. Slido), although we plan to use other options in the next months (e.g. Miro).

2.2. General roadmap

DWC Local CoPs are following a building blocks approach for the organization of supporting activities. Although a general planning is being done, this remains flexible and is adapted to the main agreements and points of interest that come up from the activities with stakeholders, as well as to the progress in the development of the digital solutions.

With the initial design of local CoPs (see **Annex 1** for more details), a general roadmap was agreed with all city leaders, including a timeline and a list of the main actors to be involved³.

In Berlin and Milan, some stakeholders need to be engaged since the initial development stages of the solutions. It was planned to hold regular local CoPs activities for both cities, since a number of external actors are, on one hand, interested in capturing the benefits that may be provided by the new digital solutions; and, on the other hand, they can collaborate to increase their potential for adoption.

In Copenhagen, water utilities in the larger region are the main actors to be engaged. DWC is benefitting from an existing working group involving these utilities, which regularly meets to share experiences and improve coordination of tasks for integrative water management. Similarly, in Paris there are several working groups and a broader Community of Practice composed of several actors who collaborate to improve water quality in river Seine with 2024 Olympic Games as reference. DWC activities are planned to be incorporated on this existing frame.

In Sofia, the engagement of external stakeholders will be more important once some preliminary results are available; therefore, the local CoP activity is planned to be initially limited and focused mostly on providing information and communicating about the project.

³ This information was included in an internal document called "Guidelines to support DWC local CoPs" produced as means of verification for milestone 5.1.

2.3. Description of Local CoP events in each city

As a tentative planning, it has been suggested for local CoP meetings to include an informative phase, i.e. to update all members on project progress and accomplishments, along with other types of more interactive activities. It may for example comprise:

1. Brainstorming for identification of end-user needs and requirements;
2. Participation in testing or demonstration events; presentation of preliminary results or beta versions of prototypes
3. Brainstorming on how to consider transversal issues into the implementation of the digital solutions (interoperability, cybersecurity, public awareness, governance, etc.);
4. Communication and networking events (e.g. linking to local initiatives or ongoing projects); etc.

It was also suggested to organize an initial presentation meeting to introduce the DWC project to the key target stakeholders and to identify other stakeholders that could be interested in joining the CoP activities. A supporting guideline for the preparation of this presentation meeting has been drafted, including additional information for the organization of participatory processes (see **Annex 2**).

Activities carried out in each of the five DWC cities are described within the following sub-sections. The templates used for reporting each event or specific participatory activity are included in **Annex 3**.

2.3.1. DWC Berlin

The initial activity of DWC Berlin was the organization of a **press conference** (Figure 1) in September 2019. It was aimed to present the DWC project, as well as the main planned activities in Berlin, to key stakeholders and the general public. This press conference was managed by the BWB communication team.



Figure 2. DWC press conference in Berlin on September 2019

Meanwhile, in September 2019, DWC Berlin (name of the Local DWC CoP in Berlin) held their **first meeting**, with attendance of a group of around 20-25 people representing project technical partners (KWB, BWB, Ecologic institute), project innovators (e.g. Vragments), and representatives from several public institutions (Water Authority, Berlin Senate Department for Economics, Energy and Business and Berlin Partner GmbH).

The meeting included a presentation of the DWC project (e.g. project structure and key goals and ambition), a short presentation of the DWC digital solutions being developed and implemented in Berlin, and a participatory workshop.

Attendants were explained the concept of local communities of practice in DWC, describing our goal of considering water management in the city as a whole, and facilitating that local stakeholders benefit from the developed digital solutions. Furthermore, they were also explained the DWC offer to include expectations and requirements of local stakeholders into the development of digital solutions.

As part of the workshop, attendants provided their opinion and feedback (see example in picture below) on a number of specific questions:

- What barriers to digitalization do you encounter in your daily work?
- What is your assessment of the degree of digitalization in your institution?
- What are your expectations of the products developed in DWC Berlin?
- Which DWC digital solutions are more interesting for your institution?
- What synergies do you see between the solutions developed in DWC Berlin and your work?

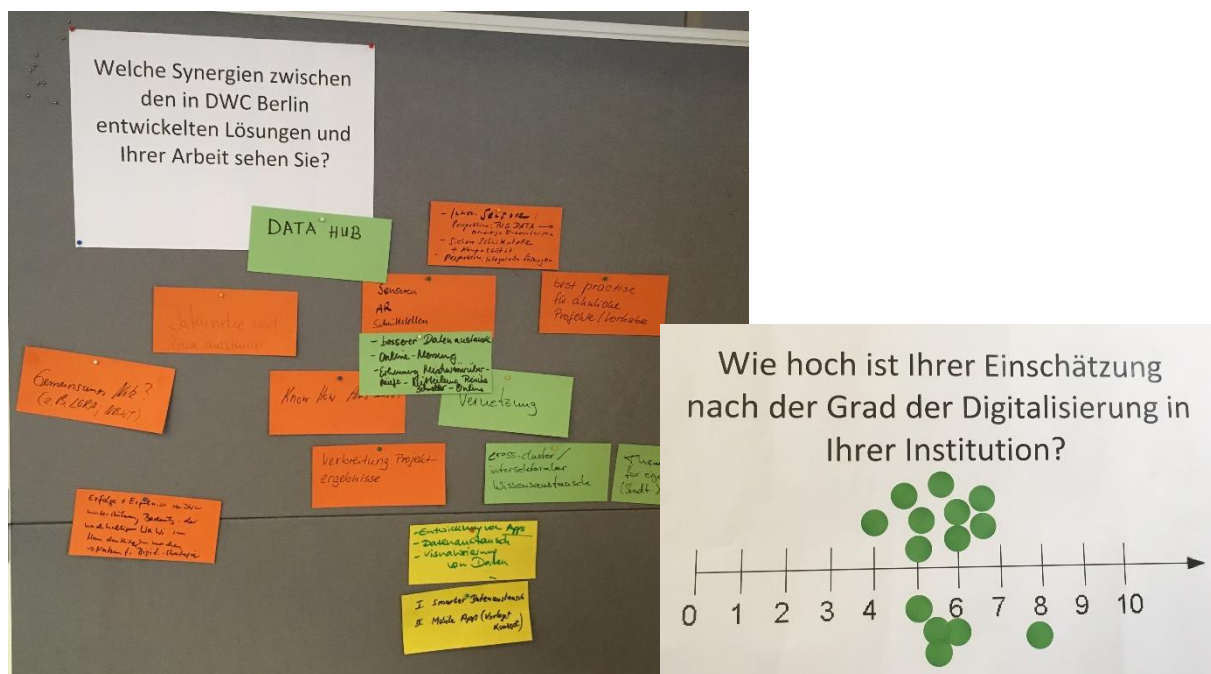


Figure 3. Examples of feedback from the 1st participatory workshop

The methods and results obtained in this meeting were presented to the other DWC cities in the first project General assembly (Berlin, September 2019).

The **second DWC Berlin meeting** was organised in June 2020. Prior to this meeting, a newsletter was forwarded to the list of stakeholders included in the local CoP. This is a short online document structured in four sections:

- General project information
- Ongoing activities and outcomes in Berlin
- Feedback from last DWC Berlin
- Agenda of the next DWC Berlin

This second CoP meeting had a workshop format (using a brainstorming/exchange approach) with two main objectives: i) to inform the DWC Berlin partners about the status of the project and ii) to further determine the expectations of the partners in Berlin regarding the development of a specific digital solution.

The meeting was initiated with a keynote speech from a representative of the German ministry of environment on the topic of virus and bacteria in the urban water cycle, followed by a presentation of the ALERT system tested in Berlin for online measurement of bathing water quality. Then, the core of the meeting was to exchange feedback on the expectations from and potential collaboration in the development of the augmented reality groundwater visualization tool in Berlin, after a presentation of the progresses made with this solution and planned next steps.

All participants attending the first DWC Berlin meeting were invited and kept informed about further progress in DWC. The atmosphere in the second meeting was already showing confidence and trust from the participants that their input was taken seriously. e.g. developing the augmented reality tool.

Other topics for future meetings (e.g. data exchange; use of FIWARE) were also explored.

2.3.2. DWC Copenhagen

The DWC local CoP in Copenhagen (DWC Copenhagen) is taking advantage of an ongoing operational group for integrated water management involving BIOFOS and other water utilities in the Copenhagen greater region. This group includes the key actors to support the development of the digital solutions being developed and tested in Copenhagen. This operational group consists of a set of stakeholders meeting regularly and sharing expectations, which can be used for our product development. In particular, the feedback from other water utilities is very relevant to the development of the “Web platform for integrated sewer and wastewater treatment plant control”, which in addition is directly related to other two DWC solutions (i.e. sewer flow forecast toolbox, and the interoperable DSS for stormwater management). This is an interoperable visualization platform, which provides data and analytics to all stakeholders responsible for the integrated management of sewer networks and wastewater treatment plants (WWTPs) in an urban area. The scope and ambition of DWC Copenhagen, as well as the digital solutions, have already been presented to the group during one of the regular meetings.

BIOFOS is being supported by ICA for the provision of moderation and facilitation techniques that can help to better identify and collect stakeholders’ views and expectations, and then transform these into concrete visualizations and features which may be implemented into the tool. Currently, a specific activity is being designed to gather information about why water utilities are not using the current system for integrated management at catchment level. Goal of the activity is also to highlight the functionalities that need to be included in the new system to allow its future use by all stakeholders. The activity will be based on the use of an adapted version of a method known as the “pentagonal problem”. We plan to utilize a consolidated methodology for problem specification (i.e. the pentagonal

problem analysis), following the introduction of a number of changes in order to put the focus on our need to identify specific features that could be implemented into the web platform. This design is currently being internally discussed with aim of organizing the activities in January 2021.

2.3.3. DWC Milan

The DWC Milan **presentation meeting** was postponed from early April 2020 to July 2020 due to Covid-19 emergency. Although it was originally planned as a face-to-face meeting (in coincidence with a general WP2 meeting), the event was finally held online a few months later. For this online meeting, it was decided to keep the audience limited to the most relevant stakeholders.

The main objective was to provide an outline of the project as well as a detailed view of the activities implemented in Milan to the most relevant stakeholders forming the local CoP. In particular, the objective was to bring out their expectations regarding the deployment of a reused wastewater network for agricultural irrigation in the Milan area.

The stakeholders were hosted by CAP Holding supported by two DWC partners, (i.e. Università di Milano and Università Politecnica delle Marche). They represented three large farmers' associations and public bodies (COLDIRETTI, Confagricoltura, ETC-Villoresi). The meeting agenda included introduction of participants, presentation of the DWC project, explanation of the DWC strategy to implement reuse of reclaimed wastewater in Milan city, concluding with a discussion on this strategy and next actions.

Stakeholders provided valuable feedback on other institutions and local actors, which could be part of the reclaimed wastewater value-chain, and on how some potential barriers can be overcome. This initial interaction was rather dominated by managing representatives of agricultural associations. Therefore, the debate remained quite general and at a political level, rather than addressing practical and technical issues. In addition, some of the invited stakeholders did not demonstrate yet a full commitment to the reuse of treated water in agriculture (e.g. because of sanitary concerns about water quality). However, this interaction at a higher level was considered necessary to set the ground for more detailed exchanges between DWC partners and farmers, and other stakeholders (e.g. water reclamation managers).

As a follow up activity, an **initial DWC Milan** meeting was organized in November 2020. This was an online meeting with participation of around 40 people including project members and stakeholders representing local (from Lombardy region) farmers' associations, water utilities, irrigation consortia, public bodies and environmentalists (see Figure 4 below).

The agenda included presentations of the match-making tool, which links water demand for irrigation and safe water availability (DS5.1), the active unmanned aerial vehicle for analysis of irrigation efficiency (DS5.2), the serious game on the water reuse-carbon-energy-food-climatic nexus (DS6), and the Early Warning System for safe reuse of treated wastewater for agricultural irrigation (DS3).



Figure 4. Initial DWC Milan meeting

Initial feedback was collected from the stakeholders using Slido software, regarding the settings and relevance of the solutions for the Milan context. It includes e.g. the preferred time-period to receive information about availability of re-used water for its use in irrigation; the importance of the consideration of the carbon footprint of water used for irrigation; the relevance of solutions for the improvement of agricultural productivity and sustainability; and the initial interest from stakeholders to the presented solutions.

As a follow-up of the CoP, several participants got in touch with CAP to clarify some aspects and present some suggestions for the implementation of the project activities that are being discussed among the partners.

The next event, that will be scheduled indicatively for the end of February/beginning of March 2021, will focus more specifically on one of the digital solutions, possibly on the Early Warning System, in order to more specifically identify expectations and potential requirements for adoption from different stakeholders.

2.3.4. DWC Paris

In the frame of the activities supporting the organization of the next 2024 Olympic Games, a working group involving a large number of actors (including SIAAP) is collaborating to improve water quality status and monitoring in river Seine. For example, SIAAP is an active member of the “bathing consortium” which has been established in order to reach the goal of sufficient water quality for bathing.

DWC project and planned activities in Paris have been presented under the umbrella of this ongoing initiative, and in the next months, DWC Paris is considering to take advantage of this action to collect feedback and expectations, which may support the development and implementation of DWC digital solutions in Paris.

The first CoP meeting is under preparation and it plans to support the development of DS18 (mobile app to communicate bathing quality), involving members of the bathing consortium and stakeholders

representing citizens and authorities. The goal of the meeting is to associate bathing site managers in the making of the “expert” app, in order to build trust into the tool and collect their questions, ideas and fears. In particular, we want to determine if the outcomes of the Early Warning System provide enough information to take rational decision on opening or closing a bathing site, or if the results need to consider additional information sources. Once the decision of opening or closing a bathing site has been made, this information will feed the “public” app to communicate with the citizens. Here again, the CoP will help determine the relevant information to be included in the interface such as the weather, the water temperature, or the occupancy of the bathing site. In addition, focus groups will be organized to determine the type of technology that the public wants (mobile app, website...) and determine the expected key information to include in such application.

2.3.5. DWC Sofia

As shown in the Local CoPs design (see Annex 2), the two main groups of stakeholders to be involved in DWC Sofia are the municipalities and other Bulgarian water utilities. However, the involvement of both groups will be relevant once some results can be shown and discussed in detail, which will happen in the second part of the project. Input from the stakeholders is not required for the initial development of the digital solutions. Meanwhile, interaction with stakeholders in a later stage (i.e. once preliminary results are produced) will be focused on discussing how the solutions can be better adopted and integrated with other processes, and also how results can be presented and reported to better support decision-making.

Therefore, it was decided to initiate DWC Sofia through a press conference in March 2020 to present DWC and the digital solutions tested in Sofia. The conference had to be cancelled due to Covid restrictions and was rescheduled over the year along with several events (Youth Science and Technology Conference, DWC General Assembly, conference on innovative water management and circular economy). Unfortunately, it had to be cancelled each time due to the health situation in Bulgaria.

As aforementioned, stakeholder engagement is not critical for DWC Sofia in the initial stage of the project, so this series of delays are not creating a negative impact on the adequate progress of the planned actions to support innovations development. In any case, an event will be tentatively organized in early 2021 to present the project to the relevant stakeholders.

3. ACTIVITY OF THE DWC PROJECT COP

In the initial 18 months of the DWC project, two Intra-Project CoP meetings have been prepared and conducted:

- i) DWC CoP#1: a World Café exercise organized as part of the first DWC General Assembly (Berlin, September 2019)
- ii) DWC CoP#2: an online event focused on presenting DWC cyber-security aspects and sharing experiences on real time control systems of sewers and WWTPs (Online, October 2020)

3.1. Project CoP#1

The main aim of the World Café exercise was to gather information regarding: i) any potential interaction of local CoPs in each city with the development of the digital solutions and ii) the importance of transversal topics (cybersecurity, interoperability, ICT governance and policy uptake)

for the deployment of the solutions. A set of guidelines were prepared and circulated prior to this activity comprising the following:

- An introduction to the World Café method
- Instructions for the preparation of the World Café exercise (e.g. organization of World-Café tables and visiting rounds). Three tables were hosted by WP leaders, grouped as WP1 + WP2 (table 1); WP3 and WP5 (table 2); and WP4 (table 3).
- Definition of key objectives for each World Café table, e.g. to map the potential interactions between Digital Solutions and Local CoPs; to identify how important the transversal topics of WP4 (e.g. cybersecurity, interoperability) are in each of the cities; and to think about potential transferability of DSs to other cities (with different contexts).
- A list of tentative questions for each table. Discussions followed a “semi-guided” approach, i.e. the same general questions were asked to all the City Leaders, although the focus of each conversation differed between the cities, depending on which topics are more relevant for them.

Examples of questions addressed to the cities were:

- How relevant is the involvement of external stakeholders (not participating as partners) to facilitate and improve the development of the DS and increase the benefits from these DSs to the end-users?
- How could the work to be done in WP3.1 be facilitated by activities at Local CoP level / Intra-Project CoP level?
- Are the cities interested in transferring the solutions being demonstrated to other cities?

The results obtained from this exercise are described in **Annex 1** of this document. These provided a starting point for setting up the local CoPs.

3.2. Project CoP#2

This project CoP was held as an online meeting, being part of the second DWC General Assembly meeting, and was attended by 40-50 people. The meeting was open to the city partners, the WP leaders and potentially interested project partners. Two main topics were raised:

Topic 1: Cybersecurity. Which are the threats and reduction measures? This topic was led by SINTEF within the frame of the activities in cybersecurity in DWC.

This meeting focused on risk identification in the context of the DWC project. The profiles of invited participants comprised risk managers, IT experts from the water utilities as well as technology developers.

The main goals were: i) to create awareness among water professionals from the five DWC cities on the importance of appropriate risk management related to cyber security; ii) to present the approach and the action plan to create a DWC cyber-related risk events registry as part of the activities of T4.2; and iii) to run a preliminary and assisted brainstorming exercise to train the attendants on how to populate the RIDB (Risk Identification database).

These goals were addressed through four presentations: 1) Cyber Threats and Water - why should we care?; 2) Definition of a risk event; 3) The Risk Identification database (RIDB) developed in the H2020 STOP-IT project; 4) Reflection on the DWC RIDB as extension of the STOP-IT RIDB) and the realization

of a training exercise with the direct involvement of representatives from the five DWC cities. In this exercise, the cities identified cyber threats related to the DWC solutions/systems under implementation in each city, and then elaborated consequences of incidents realizing identified cyber threats. As a result, the representatives from water utilities started to populate the DWC RIDB by identifying risk events and consequences.

Topic 2: Real-time control (RTC) of sewers and WWTP with modelling uncertainty: communication and decision-making.

In this session, four DWC cities, i.e. Berlin, Copenhagen, Milan and Paris, presented their local solutions related to RTC of sewer system and WWTP, also addressing integrated systems. The presentations included the description of existing or under-development systems and the architecture of these solutions. A focus was also set on the use of RTC for decision-making and the consideration of uncertainties.

- Berlin presented the existing first generation of their overall model for monitoring the combined sewer system and minimizing CSO volume. A river quality model is also integrated in this overall model. A second-generation model (SmartLISA) is currently under development, including simulation of the pumping system, a sewer simulator (including near-real time network performance and an alert system). In the exchange of the CoP, it was discussed if the SmartLISA model could also be extended for modelling the load management in sewer and integrated with the WWTP.
- Copenhagen presented its system for integrated control of sewers and WWTP. The city has implemented a stormwater control system, including filling and emptying of basins, a bypass of the WWTP biological step (with restrictions by the authorities), and Qbiomax aeration tanks. The system also produces flow predictions into WWTP using radar measurements over the region. As for visualizations, Copenhagen has implemented the SAMDUS web platform, to be improved in the frame of DWC.
- Milan presented their under-development flow monitoring system. This is including the implantation and testing of several inflow and infiltration detection methods (i.e. interferences between sewer system and surface/groundwater; periscope and CCTV inspections; electrical conductivity analysis and temperature analysis using sensors and optic fiber).
- Paris introduced their RTC system named MAGES. As elements for discussion, SIAAP identified the biggest challenges and benefits related to the implementation of this RTC system and explained the most important control mechanisms and their aim. The presentation also dealt with the visualization tools included in the system and explained how MAGES system supports or influences decisions. As for the latter, although MAGES is a sound base for decision-making, the experience and skills of operators and technicians are also a key part of this decision-making. Finally, SIAAP explained how uncertainty in RTC is considered.

During the presentations, questions from attendants were gathered using Slido software. These questions were answered by the different cities also establishing an open dialogue that allowed identifying some shared interests and potential future lines of mutual learning and collaboration. These include the following: i) cost-evaluation analysis of conductivity and temperature methods to detect CSO and infiltration; ii) comparison of results between managing overflow with aeration tanks or equalizing the flow using sedimentation tanks to overload; iii) methods for emptying the storage tanks in the sewer system in case of potential overflow and capacity to manage flows in WWTP; and iv) reporting and communication tools. A main discussion point was to evaluate the robustness of the

simulation results and the possibility to gain the correct “calibration data”. During the meeting, a separated workshop for all utilities was proposed to exchange on introducing Artificial Intelligence (AI) processes for calibration.

ANNEX 1. DESCRIPTION OF THE MAIN AIMS AND PROFILES OF THE DWC LOCAL COP'S

This section summarizes the main results from a World Café exercise that was part of the General Assembly meeting held in Berlin in September 2019. City leaders and WP leaders participated in this exercise, facilitated by ICA. The participants in the exercise were separated into two groups, i.e. the “table hosts” (WP leaders) and the “table visitors” (City leaders). There were three rounds, and after each of these the “visitors” rotated to a different table. The key objectives were:

- a) To map the potential interactions between Digital Solutions and Local CoPs with the final objective of defining the topics and stakeholders of the local CoPs.
- b) To identify how important are the transversal topics of WP4 (e.g. cybersecurity, interoperability) in each of the cities.
- c) To think about potential transferability of DSs to other cities (with different contexts) building on the planned analysis on existing governance frameworks, policies and stakeholders within WP3.

The results are summarized in this section in terms of commonalities and differences among DWC cities and specific characterization for each city.

Commonalities

Based on the discussions, a number of common points among several DWC cities have been identified⁴:

1. Cities are in general very interested in **exchanging experiences** with other cities, e.g. learning how other cities are implementing a specific Digital Solution or which kind of barriers or limitations have been identified.
→ [This mutual learning could be fostered through specific activities conducted by the Intra-Project CoP. Moreover, the knowledge exchange could also be extended to other cities currently not involved in DWC, i.e. through the organization of workshops.]
2. Some of the cities (i.e. Copenhagen, Milan) envisage potential **collaborations with ongoing projects** at the local scale. This kind of networking activities provide opportunities for improved adoption and/or dissemination of the expected results.
3. A crucial aspect to be decided is **when to engage with the relevant stakeholders** (e.g. from the beginning, once initial results are available, when digital solutions are sufficiently tested, at the end of the project for communication and dissemination purposes, etc.).
4. One of the key reasons for involving stakeholders into the project activities is **building trust**. This social capital is considered as an important driver for the adoption of the digital solutions. Related to this point, the involvement of operational teams may be particularly remarkable in order to improve the usability of some solutions.
5. **Data exchange** is considered a significant challenge for many of the cities. There is a need to better understand which data exchange is needed, and which data can be exchanged, i.e. open data / critical data.

⁴ For some of these common points, some follow-up ideas were suggested. These are written [between brackets]

6. There is no common understanding yet on **what is meant by ICT governance** in the water sector.
→ [Our analysis related to innovative modes of ICT governance will be based on interviews with relevant stakeholders in the demo cities. These interviews could be complemented with other activities at Intra-Project level (e.g. a workshop with all city leaders and relevant stakeholders)]
7. The discussions on **cyber-security and interoperability** lacked time to get into the details, although this was expected. The general scope and right contacts were identified for all cities and follow-up activities will be organized to deepen into these two topics.
→ [These are considered as very relevant topics for joint discussion at Intra-Project level.]

Differences

In addition to the common points, a number of differences have been recognized:

1. There are different needs as regards to **stakeholder involvement**, i.e. ranging from a strong interest by stakeholders to cooperate in the co-development of some solutions to cases where the need of stakeholder involvement is very limited (e.g. Sofia). This must be taken into account for the design of the activities of Local Communities of Practice.
2. The required **stakeholder involvement** is related to different stages in the solutions development, namely:
 - contribution for the specification of **technical characteristics**
 - consideration of **expectations from end-users** throughout the design and development of the solution
 - **convincing** end-users and stakeholders **about the benefits** from the implementation of the solution
 - increase of **communication and dissemination** of the results
3. There are differences in **problem awareness** by public authorities. For some DSs, there is a clear willingness of public authorities to cooperate to reduce existing problems (e.g. bathing quality) whereas it is not fully clear whether public authorities have a real interest in strongly contributing to sort out other problems (e.g. detection of illegal sewer connections). As for the latter case, it is acknowledged the need to make an effort to involve authorities so as to motivate them to work on the topic.
4. The discussions showed that in the different cities, **digitalization has been integrated quite differently**. Often, technical aspects of implementing new technologies and making them work prevail over ICT governance and policy aspects.
5. While Copenhagen, Paris and Milan were already quite clear on the **sensor integration and needs concerning WP4**, for Sofia IT department needs to be involved and for Berlin, expectations on strategic and tactical level need to be further sharpened.

All these points will be considered for the identification of activities and topics to be addressed by the DWC Local CoPs.

City-specific issues

The city-specific issues regarding i) the planned level of involvement of stakeholders in the implementation of the digital solutions; ii) ICT governance; and iii) cyber-security and interoperability, are presented in this subsection:

BERLIN

Implementation of Digital Solutions

A total of seven DSs will be implemented in Berlin mainly dealing with improved groundwater management and sewer system management.

List of Digital Solutions to be implemented in Berlin

CITY	DEMO ACTIVITIES IN CITIES	RELATED DIGITAL SOLUTIONS (DSs)
BERLIN	Improved operation and predictive maintenance of water wells [WP2]	DS7. Mobile application for predictive maintenance of drinking water wells
		DS8. Forecasting tool for strategic rehabilitation planning of drinking water wells
	Public awareness (groundwater management) [WP3]	DS16. Augmented Reality (AR) mobile application for groundwater visualization
	Bathing quality online monitoring [WP1]	DS1. Sensors for real-time in-situ E.coli and enterococci measurements
	Identification of illicit connections in the stormwater network [WP2]	DS9. DTS sensor for tracking illicit sewer connections
		DS10. Sensors and smart analytics for tracking illicit sewer connections hotspots
Smart sensors and analytics for real-time stormwater management [WP2]	DS14. Low-cost temperature sensors and analytics for real-time CSO and flooding monitoring	

(*) The DSs highlighted in blue are those being implemented in several DWC cities

A summary of the discussion about the needs, benefits and potential limitations of stakeholder involvement for each solution is hereafter provided:

- **DS1:** The main interest is in exchanging experiences with other cities. Other stakeholders in Berlin do not need to be included.
- **DS7, DS8 and DS16:** The Water Authority (WA) operates its own wells and is very interested in these solutions on groundwater management.

Since BWB is the intended main final user of DS7 and DS8, the suggested strategy is to foster discussion at DWC Berlin level on some key issues, (e.g. secure data exchange, sharing sensitive information) and to get these topics back into the company level.

This is seen as a good opportunity to improve efficiency of data exchange between Berlin stakeholders (e.g. WA, SenUVK) and the Water Utility (BWB). Lots of data are being collected and there is a need to share these data to improve knowledge generation.

A decision to be made is whether is it useful enough to get them on board now (i.e. to improve transferability from the beginning), or whether this involvement should occur later since now they could they bring their own problems on board and hinder the development of the solutions.

The involvement of the operational team of BWB will benefit these solutions.

- **DS9:** Water Authority is in charge of closing illegal sewer connections. Municipalities have responsibility in detecting and communicating about these connections, but they were not in the DWC Berlin initial meeting. A challenge is to involve authorities to motivate them to work on this topic.

The involvement of the operational team of BWB will benefit these solutions.

- **DS10:** This solution raised a lot of interest from stakeholders attending the first DWC Berlin meeting. Water Authority is a key actor, since some of the data they are collecting are required for the effective implementation of the solution. The Water Authority is interested in the demonstration of the solution but not in participating in its development. They could be involved in communication of results.
- **DS14:** This solution was very interesting for many stakeholders in Berlin (W.A., H.A.). This is considered as a cost-effective alternative to gather a large amount of useful data. There is an interest in exchanging data between stakeholders in Berlin. Furthermore, there is an interest in exchanging experiences with other cities where these sensors are also going to be deployed.

Planned stakeholder involvement in Berlin for the co-development of solutions

DS	Relevance of stakeholder involvement	Stakeholders to be involved and benefits	When to be involved?
DS1	No need	-	-
DS7	Data exchange	WA, SenUVK / Secure data exchange and enhanced info for GW management.	TO BE DECIDED Now vs Once the solution is more advanced
DS8	Data exchange	WA, SenUVK / Secure data exchange and better info for GW management	Limited involvement now through DWC Berlin
DS9	High	WA, municipalities / Improved detection of illicit sewer connection	From the beginning (building trust and motivating them to work on this topic)
DS10	Very High – data from WA are needed	High interest from many stakeholders (more in demonstration than in co-developing)	Once preliminary results can be shared
DS14	Data exchange	High interest from many stakeholders (WA, HA,...) / Data collection and data exchange	Once preliminary results can be shared
DS16	End-users expectations for the mobile app	End-users of the app	To be coordinated with WP3 (public awareness)

ICT governance

- It is largely undefined what digital transformation in the water sector means.
- Data exchange within BWB is a challenge
- Discussions on ICT-security of relevant infrastructure is still not really kicking off.
- A quality check protocol exists for laboratory data before publishing it, however, for other data, this is still missing.
- At the very end of the session, the question was raised about the actual benefit of digitalization.

Cyber-security and interoperability

The system in Berlin is already well-known to Sintef from Stop-it project, thus there was a broader discussion on expectations and tasks. Sintef is interested in working on strategic and tactical levels of cybersecurity with BWB, e.g. impacts of misfunctional or corruptive sensors.

BWB has not decided yet how sensor integration will be developed. IT department will be involved and they are expected to set standards that solution providers have to fulfil. BWB is interested in undertaking an approach to up-scale integration of (many) sensors and their data in data transmission procedures.

Some questions will be shared with IT departments and a workshop is to be planned between Sintef and BWB (involving IT) on topics within WP4.

COPENHAGEN

Implementation of Digital Solutions

The DSs to be implemented in Copenhagen are all related to sewer and WWTP management.

List of Digital Solutions to be implemented in Copenhagen

CITY	DEMO ACTIVITIES IN CITIES	RELATED DIGITAL SOLUTIONS (DSs)
COPENHAGEN	Sewer and WWTP management [WP2]	DS11. Sewer flow forecast toolbox
		DS12. Interoperable DSS and real-time control algorithms for stormwater management
		DS13. Web platform for integrated sewer and WWTP control

At first stage of development, external stakeholders are not important.

The key goal is to develop the solutions to improve quality of forecast. As a result, BIOFOS aims to share these results with other utilities operating sewer systems in neighbor municipalities. There is an ongoing project at operational level with utilities which provides a valid channel to replicate (platform to exchange best practices). The ultimate goal is to reduce risk of flooding through an improved system operated in a larger area.

Planned stakeholder involvement in Copenhagen for the co-development of solutions

DS	Relevance of stakeholder involvement	Stakeholders to be involved and benefits	When to be involved?
DS11, DS12 & DS13	Not important for the development. The key goal is adoption of the solutions in municipalities not currently operated by BIOFOS	Water utilities / the key benefit is reduction of flooding risk	Demonstration activities

ICT governance

- Guideline by Danna exists.
- In the Copenhagen area no standardized protocol exists. Instead, 7 utilities have to agree on the numbers to be communicated.
- Municipalities are mostly perceived as stakeholders that lack the technical knowledge to understand particular aspects of the innovations.
- Local authorities are afraid of data misuse.
- Utilities decide on innovation (not authority)

Cyber-security and interoperability

BIOFOS was already quite specific and able to answer most of the questions. These will be shared with IT departments and a follow-up meeting is to be organized.

MILAN

Implementation of Digital Solutions

Six DSs are being implemented in Milan area, all of them related to safe water use for irrigation

List of Digital Solutions to be implemented in Milan

CITY	DEMO ACTIVITIES IN CITIES	RELATED DIGITAL SOLUTIONS (DSs)
MILAN	Safe water reuse for irrigation [WP2]	DS1. Sensors for real-time in-situ E.coli and enterococci measurements
		DS3. Near real-time Early Warning System for safe water reuse
		DS4. WebGIS platform for improved management and decision making in water reuse
		DS5. Match-making ICT tool between water demand for irrigation and safe water availability
		DS6. Active unmanned aerial vehicle for analysis of irrigation efficiency
		DS17. Web-based serious game for the water reuse – carbon – energy – food – climatic nexus

(*) The DSs highlighted in blue are those being implemented in several DWC cities

A summary of the discussion about the needs, benefits and potential limitations of stakeholder involvement for each solution is hereafter provided:

- **DS1:** The solution will be tested for estimating bacterial use in water use for irrigation. No relevant need for stakeholder involvement since sensors will be installed in CAP facilities.
- **DS3, DS5, DS6:** The primary stakeholder is the national Farmers Association. This is particularly important for the early phase of development and they have shown a solid commitment.

Other stakeholders (consumers, actors in the food value chain) need to be involved in later stages, in particular to better understand potential reactions and acceptance of consumption of food irrigated with wastewater.

There are other stakeholders to be considered:

- Irrigation Communities: responsible of water quality delivered to the farmers (they “sell” the water to the farmers).

- Water Authority: interested in supporting water bodies recuperation

- Farmers (to be engaged later in the process, since the Early Warning system is mainly addressing ICs

- Environmental NGO’s (e.g. Legambiente)

- **DS4:** There is a fellow company interested in applying same methodology
- **DS17:** The aim of the tool is awareness raising. Interest of citizens is crucial. There is an ongoing LIFE project devoted to raising awareness on Climate Change (collaboration opportunity). Legambiente to be involved but also smaller NGO’s. Engagement could happen once a preliminary version of the game is produced (i.e. sharing initial data).

Planned stakeholder involvement In Milan for the co-development of solutions

DS	Relevance of stakeholder involvement	Stakeholders to be involved and benefits	When to be involved?
DS1	No need	-	-
DS3, DS5	High	Farmers Association (key stakeholder); consumers, food value chain; Irrigation Communities; Farmers; Water Authority; Environmental NGOs	Farmers Association to be engaged at an early stage. Other stakeholders will be involved later in the process.
DS4	Not a strong need – possibility of replication		
DS6	Data provision	Farmers Association Irrigation Communities; Farmers	Support to development and demonstration
DS17	High	Citizens; Environmental NGOs; Water Authority	Once a preliminary version of the game is prepared

ICT governance

- Web GIS application has been published, however, without the framework of overarching policy and rather based on a single initiative.
- Data protection and IPR are open questions and could motivate the creation of new policies.
- Fear of misinterpretation hinders data publication.
- It is yet unclear who is taking responsibility for data validity and quality. Data should meet end-user needs. Thus, instead of making raw data accessible, data communication becomes key here to cater end-user needs and make it understandable to them.

Cyber-security and interoperability

CAP was already quite specific in addressing the questions.

An online meeting is to be set up between CAP and Sintef to go into further detail of the solutions.

PARIS

Implementation of Digital Solutions

Three DSs related to bathing quality are being developed for Paris.

List of Digital Solutions to be implemented in Paris

CITY	DEMO ACTIVITIES IN CITIES	RELATED DIGITAL SOLUTIONS (DSs)
PARIS	Bathing quality [WP1]	DS1. Sensors for «near» real-time ^(**) in-situ E.coli and enterococci measurements
		DS2. Machine-learning based Early Warning System for bathing water quality
		DS18. Mobile app to communicate bathing water quality to citizens

(*) The DSs highlighted in blue are those being implemented in several DWC cities

(**) Near real time means that a few hours are needed to get the result but in-situ sensors help to save a lot of time

As for **DS1**, no relevant involvement from end-users is required. Feedback from other cities is interesting, i.e. how other cities are implementing this and barriers or constraints for implementation.

For **DS2**, the Health Authority is the key stakeholder. An important activity is to decide on the acceptable reliability of the forecast. This will have a direct effect on how much resources need to be invested. Data exchange to feed the model is also required.

Regarding **DS18**, the solution retained in the grant agreement is the mobile app dedicated to communicate water quality to the citizens that we called “Public” app. However, it is important to note that an “expert” app will also be developed. This app is for the bathing site managers and will contain the results of the Early Warning system (DS2).

For DS2 and DS18, expectations from end-users need to be taken into account. Hidden social aspects will be analysed as part of WP3.

Planned stakeholder involvement In Paris for the co-development of solutions

DS	Relevance of stakeholder involvement	Stakeholders to be involved and benefits	When to be involved?
DS1	No need	-	-
DS2	High	Health Authority / Agreement between forecast reliability and resources to be invested; Data exchange for solution development	From the beginning
DS18	High	Citizens and Authorities (decision-makers) / Consideration of end-users' expectations and requirements	Coordinate with WP3

ICT governance

- There is no major discussion evolving around ICT governance yet.
- Questions have been raised on the process of making data accessible.
 - ➔ National law requires making data accessible; however, this has not happened yet.
 - ➔ What kind of data, for what destination and which kind of end user, in which delay? Raw data? Validated data?
- Different levels of ICT governance were brought up:
 - ➔ Internal (authority)
 - ➔ between authorities
 - ➔ between authorities and end users
- In Paris exists an exchange between authorities and innovators as data from sensor monitoring is being sent to authorities
- In France, formalised data exchanges procedures already exist concerning WWTP self-monitoring and natural water quality monitoring. This data exchange process is managed by the SANDRE.

Cyber-security and interoperability

SIAAP was already quite specific in answering the WP4 questions. However, implementation of sensors is not defined, yet. An internal steering committee is currently involved in this decision (with IT and neighbour utilities). An open issue is data transmission.

SOFIA

Implementation of Digital Solutions

Two solutions are being implemented, both related to improved sewer and storm-water system management.

List of Digital Solutions to be implemented in Sofia

CITY	DEMO ACTIVITIES IN CITIES	RELATED DIGITAL SOLUTIONS (DSs)
SOFIA	Sewer and stormwater management [WP2]	DS14. Low-cost temperature sensors and analytics for real-time CSO and flooding monitoring
		DS15. Smart sewer cleaning system with HD camera and wireless communication

(* The DSs highlighted in blue are those being implemented in several DWC cities

The need of stakeholder involvement is low for both solutions.

For **DS14**, the final aim is to provide an evidence to municipalities in Sofia area (consisting of 24 municipalities) about the need to construct drainage pipes to improve sewer system. Currently, 10% of CSOs are without outfall to river. The information gathered through the network of sensors also is expected to be useful for communication issues (i.e. reporting). Involvement of municipalities will happen at a later stage of the action, after getting data that can be trusted.

As for **DS15**, no involvement required from external stakeholders, since the main objective is for promotion of the company (i.e. demonstration of benefits obtained by an increase of the efficiency in the cleaning works, e.g. reduction of traffic jams).

Planned stakeholder involvement In Sofia for the co-development of solutions

DS	Relevance of stakeholder involvement	Stakeholders to be involved and benefits	When to be involved?
DS14	No need for operation of the solution	Municipalities / to proof the need of an improved drainage system	Later, after getting data that can be trusted
DS15	No need	Other water utilities	-

ICT governance

- o Only a limited amount of data is being shared and only within utilities for operational issues.
- o Data protection is not a major issue yet.

Cyber-security and interoperability

Sofiyska Voda was quite specific on the objectives and number of sensors to be installed, although not aware of IT details. However, IT division should be able to answer questions. These questions will be shared with and an online meeting will be prepared.

ANNEX 2. ADDITIONAL INFORMATION INCLUDED IN THE GUIDELINES TO SUPPORT ACTIVITY OF LOCAL COPs

As part of the guidelines to start operating and support activity of local CoPs (M5.1), some annexes were included with some useful information for CoP managers:

- a) Description of general steps in participative processes;
- b) A catalogue of methodologies and event formats for facilitation of workshops;
- c) Suggested messages to be included in the invitation for the presentation meeting of local DWC meeting;
- d) A detailed guidelines for the organization of the DWC presentation meeting of local CoPs.

A) GENERAL STEPS IN PARTICIPATIVE PROCESSES

First of all, the organization and conduction of participatory processes for interaction and co-development with stakeholders should follow a series of key principles.

1. Objectives should be clearly stated;
2. Methods should be adapted to the local cultural / institutional / context;
3. There should be a broad range of interested parties / individuals;
4. Transparency in using the information: it is key to make clear how stakeholders' views will be used and what the information resulting from the workshop will serve for;
5. Allocate sufficient time to carry out the activities without overloading the participants. Some time for breaks and networking is necessary and helps creating connection and engagement between the participants;
6. Stakeholders should receive intermediate feedback and summary of results and conclusions from their contributions during the course of the process;
7. The results of the process should have an impact on the decision to be made or the process in which they are to be involved;
8. We should search for evidence of enhanced stakeholder understanding – i.e. social learning.

Having these keys in mind, structuring the organization of stakeholder engagement participatory processes can be done in a series of sequential steps. These steps describe the methodological backbone and logic to develop a coherent and fruitful participatory workshop or session, as well as the elements and aspects to be prepared and taken account of. However, on a broader sense the methodological logic can also be applied to structure the whole participatory process composed of several iterative workshops, where stakeholders are embarked in several phases of the process with bilateral information exchanges: stakeholders provide information and insights and receive feedback and results from previous phases.

Steps for the organization of a participatory workshop:

STEP 1. Define the objectives. You should define the main and secondary objectives of the workshop. The following questions can help identify both categories objectives.

- *What do we need to get (outcomes) from the participation process: information (quantitative, qualitative, perceptions, awareness...)?*

- *In which format do we need the information: numbers, causal relations, concrete data, general knowledge, perceptions, spatial representations...?*
- *Are we seeking any additional effects besides our main inputs: e.g. building sense of community, raising awareness, promoting networking and communication between the actors, foster/show transparency, educate on something/disseminate information...?*

STEP 2. Define the best methodology to obtain the required outcomes. Depending on the type of outcome and the format required, a different methodology or set of methodologies will be more convenient. A set of examples of methodologies suited for obtaining different types of outcomes is provided in this annex. Once the methodology has been selected, the most logical and efficient sequence of steps should be defined, looking at optimizing time and resources while ensuring the achievement of results.

STEP 3. Materials and resources needed: once the exercises and dynamics have been designed, a list of required materials and resources should be prepared to make sure everything needed can be available. In case some critical element cannot be accessed, an alternative should be searched for (alternative material, adapted exercise or an alternative method). Examples of useful materials are PPTs, post its, board charts, blackboards, stickers, etc.

STEP 4. Define the agenda and prepare a dissemination and an internal working agenda: Once the agenda has been closed, it is useful to prepare two versions:

- **Dissemination agenda:** should include the title, logistics and main schedule of the workshop activities. It is aimed for sharing with the participants to provide them with the essential information and attract their interest.
- **Internal working agenda:** it should contain the same items as the external agenda, completed with the distribution of tasks among the organizing team and the preparation details, as a sort of a script for the organization and conduction of the workshop. Possible tasks include overall moderation, facilitation of groups, note taking, generation of visual material (pictures, videos), etc.

STEP 5. Pilot workshop

Carry out a pilot test of the workshop to make sure the exercises can be done within the allocated time, to foresee any possible unexpected situations (questions, polemics) and prepare responses, and make the organizing team get hold of their tasks. Make any adjustments as required.

STEP 6. Define the list of actors to be invited

Make sure that all the interested groups are represented, and there is a certain balance, unless the objective of the workshop is especially focused on one or two specific groups.

STEP 7. Logistics

- **Prepare logistics:** book a place for the venue, book the catering/drinks, prepare and buy the materials with time.
- **Send the invitations to the participants via email and make any personal contacts** (by phone or in person) for those stakeholders potentially more difficult to reach via email (i.e. farmers, old people, etc.).

- Ask for confirmation of assistance and send reminders when the event gets closer. Some additional phone calls may help get further responses if the response rate has been low.
- Prepare attendance list and consent forms for the use of images, data protection, possible sharing of email among participants, attendance forms.
- Organize and manage reimbursement of travel costs if applicable.
- Prepare accreditation tags.

STEP 8. Process evaluation

Undertaking some kind of process evaluation is important in order to assess: 1) the quality of the process, 2) the satisfaction of participants / Suggestions for improvement, 3) to gather additional individual based information or feedback, 4) assess the perception of usefulness, learning from the process. This can be done through forms or surveys at the end of the day, or through an evaluation email submitted one or two days after the workshop. Generally, any feedback gathering method onsite will gather more responses than ex-post via email.

STEP 9. Post workshop processing tasks

- Send a thanking email to the attendees.
- Gather and digitalize the information co-produced with stakeholders during the workshop.
- Analyze the information and turn it into usable results for the project/process' aims. Draw out a few conclusions of the session.
- Prepare a summary note of the workshop, including the results and conclusions achieved, and disseminate it among participants.
- Proceed to the reimbursement of travel expenses if applicable.

Final specific keys or recommendations to ensure the success of a participatory workshop or session include the following:

- Make sure to explain very well the objective of the workshop and how it fits within the broader project/process, and if there will be future follow up/next phase sessions.
- Explain how the inputs from the participants will be included.
- Explain carefully what the role of the participants is and what they will be asked to do during the session.
- Send a summary of results and conclusions 2 or 3 weeks after the workshop and another final summary by the end of the process/project.
- Provide information that may be useful/interesting for the participants.
- Ensure a good moderation so all the participants feel equally encouraged to contribute and there is an atmosphere of respect, order and equality.
- Try to integrate the stakeholders' interests in the discussion topics/exercises to ensure a balance between their concerns and needs and the specific objectives of the process.
- Make always sure that stakeholders end up with a feeling that their opinions have been listened to and taken into account.

B) CATALOGUE OF METHODOLOGIES AND EVENT FORMATS FOR DINAMISATION OF WORKSHOPS

There are a wide range of methodologies that can be used to dynamize workshops and ensure the achievement of objectives in a smooth and interactive manner.

Most of the techniques can be classified according to their function within the workshop and the objectives it pursues (Geissler and Löffter, 2007)⁵.

- A) Presentation and activation techniques. These are aimed at introducing the participants among themselves, attracting their attention, breaking the ice and fostering a participative and dynamic environment.
- B) Analysis and data gathering techniques. These are aimed at reflecting about a topic, raise awareness about the importance of a topic, transfer or communication of knowledge and results to participants or gathering data.
- C) Evaluation techniques. These are aimed at evaluating the performance through a selection of indicators that can cover participation, interest, utility, understanding, etc.

The following boxes present a series of examples of techniques within each category.

A) PRESENTATION AND ACTIVATION TECHNIQUES	
SCHOOL BUS	
Objective	Make participants aware of the common features (stakeholder group, origin, interests) and interests of the other participants.
Suitability	Big groups with insufficient time for individual introductions and a great variety of profiles and sectors.
Method	<ul style="list-style-type: none"> - List of strategic questions (origin, sector, interest, objective) - The organising team members hold labels with the answers distributed throughout the room - Participants need to go the “stop” with the answer that suits them best

WRITTEN NAMES	
Objective	Make participants introduce to each other
Suitability	Small groups (<20) where interaction will be important and a networking effect is sought.
Method	<ul style="list-style-type: none"> - Place participants in a circle holding a card with their name - The participants should try to memorize all names within 5 minutes - The cards are gathered, mixed and distributed again randomly - Each participant should find the owner of the name in his assigned card

⁵ Geissler and Löffter (2007) Multi-stakeholder management: Tools for Stakeholder Analysis: 10 building blocks for designing participatory systems of cooperation. GTZ, Germany.

SPIDER NETWORK	
Objective	Make participants introduce to each other and break the ice
Suitability	Small groups (<15) where strong interactions are expected and time available is of 20-30 minutes
Method	<ul style="list-style-type: none"> - Place participants in a circle. - The first participant receives a thread ball and briefly introduces himself. Holding the thread edge, he/she passes the ball to a random person in the circle, who holds the next bit and repeats the process until all the participants have spoken and are holding a piece of thread, building together a spider network. - The last participant receiving the ball starts an inverse round rolling it back and repeating the information from the participant holding the next stretch of thread.

B) ANALYSIS AND DATA GATHERING TECHNIQUES

BRAINSTORM	
Objective	Gather unbiased perceptions/ideas from participants on a topic
Suitability	When there is a need to gather unbiased opinions, perceptions or proposals from the participants
Method	<ul style="list-style-type: none"> - Make small groups with a balanced representation of actors - Write the target question in a board chart and ask participants to think of ideas, write them down on post-its and paste them around the question. - The facilitator should classify them

WORLD CAFÉ	
Objective	Carry out good dialogue and exchange of knowledge on a specified topic
Suitability	Any group with space to move chairs.
Method	<ul style="list-style-type: none"> - Make small groups of 8 to 10 people to discuss the topic, while seated around individual tables. - The composition of the group can change because everybody moves on to other tables after a short period of time. - One person always remains at the table as the host and, by doing that, ensures that the exchange of knowledge is fast and saved. - The results of all the discussions are presented at the end of the session.

PRO ACTION CAFÉ	
Objective	Host conversations about questions and projects that matter to the people that attend.
Suitability	Small groups (<15) where strong interactions are expected and time available is of 20-30 minutes
Method	<ul style="list-style-type: none"> - Opening circle to connect to the purpose of the session - Ask participants to consider a question they would like to explore for the session and if so, they will be called on to share it and invite others to work with them. - Three rounds of conversation (20-30 minutes each) with a specific focusing question to move the conversation through an evolving process. - Feedback in circle: the host of each table shares what was discussed.

FISH BOWLS	
Objective	Facilitate discussion in large groups by having just 3-6 people talk at any one time.
Suitability	Big groups that should have discussions
Method	<ul style="list-style-type: none"> - People who should speak are seated in the centre of the room while the rest of the participants (maximum of 50 people) sit around the outside and observe without interrupting. - You can have “closed” or “open” fishbowls, meaning that the discussion is either exclusive to the selected participants or one or more of the chairs is open to members of the audience who want to ask questions or make comments. -Although largely self-organising once the discussion gets underway, the fishbowl process usually has a facilitator or moderator.

GRAPHIC VISUAL RECORDINGS	
Objective	Make visual representations of the ideas presented by speakers or introducers facilitating understanding to stakeholders
Suitability	Sessions with many presentations and the need to explain multiple concepts and ideas.
Method	<ul style="list-style-type: none"> - Graphic recording artists work hand-in hand with the speakers to visually depict the key points and messages of your session. - These artists can either draw live onstage on a board or they can draw on a tablet/digital device which is shown on a screen.

SAMOA CIRCLE	
Objective	Promote debate within a central group of stakeholders open to contributions from other participants.
Suitability	Debate with a small target group as the centre
Method	<ul style="list-style-type: none"> - Place target participants in a circle in the centre - Sit in bigger surrounding circle all the participants that can contribute to the discussion - Explain the rules and start the debate with the small group - When someone in the big circle wants to speak they should make a sign previously agreed (e.g. stand up).

C) EVALUATION TECHNIQUES

SATISFACTION FORM	
Objective	Evaluate participant satisfaction with the workshop
Suitability	Any group
Method	<ul style="list-style-type: none"> - Prepare a form with a few closed questions (ideally tick or yes/no) and a space to write suggestions of comments for improvement - Hand it out the last hour before the end or before lunch and pick them up at the exit.

FORM OF PERCEPTION	
Objective	Identify or evaluate perception changes in the participants as a result of the workshop-exercise
Suitability	Any group.
Method	<ul style="list-style-type: none"> - Hand out a form with a few questions about the topic of discussion at the beginning of the day to record the pre-workshop perception. - Give each participant a number and ask them to write in the form and remember it until the end. - Hand out the same form again at the end of the day asking to answer the questions again and write down their assigned number. - Pair the forms by number and check any changes in perception.

EVALUATION EMAIL	
Objective	Check the perception of participants through an online survey
Suitability	Useful when statistical analyses of the answers are needed
Method	<ul style="list-style-type: none"> - Design an evaluation survey and introduce it in an online survey platform - Send the survey by email to the participants to ask for their evaluation of the workshop. - Make sure to keep the survey brief and no longer than 10 minutes.

C) SUGGESTED MESSAGES TO BE INCLUDED IN THE INVITATION FOR THE PRESENTATION MEETING OF LOCAL DWC COMMUNITY OF PRACTICE

A number of short messages is suggested to be included into the invitation letter (to be prepared in your native language):

- digital-water.city (DWC) is an innovation project funded by the European Union under the H2020 programme.
- The project will develop and demonstrate several digital solutions for urban water management, covering the most innovative technologies.
- These solutions are being implemented in five large cities across Europe: Berlin, Copenhagen, Milan, Paris and Sofia.
- DWC is creating communities of practice in each city to help to overcome the barriers from innovation to practice by involving key actors in each city and facilitate that their actual needs are appropriately considered.
- A presentation activity is being organized to inform about the project and the digital solutions being implemented in [add your city name]. Moreover, an active participation from attendants will be encouraged to identify your interest in contributing to the co-development of the solutions as well as better shape the benefits that your organization could get from these new solutions.

D) GUIDELINES FOR THE ORGANISATION OF THE FIRST PRESENTATION MEETING OF LOCAL COPs (WORKSHOP FORMAT)

The goals of this meeting are:

- i) to inform the relevant stakeholders in each city about the project and the digital solutions to be implemented in each city
- ii) to identify which benefits can these solutions provide to several stakeholders and
- iii) which actual particular requirements of the potential final users should be addressed and on the other hand,
- iv) analyze how these stakeholders can support the development of the solutions.

On top of this, this initial meetings will help to build trust on the DWC project and to create an interest in the collaboration for the co-development of solutions better fitted to the actual needs of the end-users.

The presentation meetings are expected to last for 90 minutes, although these could be extended to 120 minutes. These will be moderated by a city leader representative.

The topics suggested to be included as specific items in the agenda are:

- Presentation of DWC
- Overview of Digital Solutions to be implemented in the city
- Concept of Community of Practice
- Setting objectives for the local CoP
- Stakeholder mapping and brainstorming for the validation of the stakeholders map

Based on this list of topics, the following tentative agenda is suggested:

Presentations	Content	Extent
Presentation 1 (P1): Welcome from Project Coordinator / City Leader	Welcome and overall presentation of DWC	(5-10 min)
P2: Presentation by the session moderator	Agenda and main aims for the meeting	(5-10 min)
P3: Overview of Digital Solutions to be implemented in Berlin	Focus on DSs dealing with groundwater management	(10 min)
P4: Concept of CoP and Berlin DWC management	What is a CoP? How we intend to manage the Local CoP at Berlin?	(10-15 min)
ROUNDTABLE	Description	Extent
Topic 1 (T1): 'Tour de table'	Short presentation of all participants, including main expectations for DWC	(5 min)
T2: Setting objectives	What can DWC do for me? What can I do for DWC?	(10-15 min)
T3: Stakeholder mapping	Mapping key stakeholders for each solution (Who do you miss in this room?)	(10-15 min)
T4: Mapping relationships	How do stakeholders relate among them?	(10-15 min)

Hereafter, some suggestions are provided for the content of slides to include in the PowerPoint presentations as well as for the moderation of the discussions in the roundtable.

PRESENTATIONS

P1.- WELCOME FROM NATIONAL ORGANIZER

5-10 minutes. Presentation given by Project Coordinator / DWC City Leader

- Appreciation for coming

- Introduce the project
- Importance of the DWC project
- Importance of stakeholder involvement for DWC
- How we will be using the results
- Hopes for consultation

- *Appreciation for coming*

Welcome participants and thank them for coming to take part in this activity, part of DWC project. Present shortly the partner organisation, the institution you come from, and explain that DWC is conducted by a group of 24 partners, from 10 countries across Europe with demo activities in five cities, i.e. Copenhagen, Milan, Paris, Sofia and Berlin.

- *Introduction to DWC and importance of the project*

Short overview of DWC (brief description of the project key challenges and goals)

Why is this project important for the European Commission? (short remark)

- *Importance of stakeholder involvement*

There is a large number of digital innovations improving water management and enhancing water sustainability although the number of solutions reaching the market and adequately addressing the needs of end-users in terms of interoperability, cybersecurity, governance or increase of public awareness, etc., is in comparison, very reduced.

DWC aims to overcome this barrier (from innovation to practice) by involving stakeholders in the co-development of solutions and increase the learning on how this co-development can be facilitated and consolidated.

- *Use of results*

The feedback collected from the meetings or activities conducted by Berlin DWC will exclusively be used to support the progress of the project.

This feedback may be communicated to

- i) other project partners, i.e. partners developing digital solutions in Berlin, and partners leading the technical work packages supporting the development of innovations
- ii) the European Commission, as part of two internal documents that we are entitled to deliver by the middle and end of the project to report on the work done by the DWC communities of Practice.

The feedback will be attributed to the organisations participating in the activities and not to individual persons.

Specific permission will be asked for the external dissemination of any images or specific information related to DWC Berlin meetings or activities.

- *Hopes for the local DWC CoP*

“It is our sincere hope that you will have a very nice time at this meeting.

“We hope that “DWC *****” contribute to expand the dialogue about how to successfully implement new digital solutions in cities and that everybody will leave with a good sense of how we aim to cooperate and help each other to improve the innovations and increase their benefit for the end-users.”

P2.- WELCOME FROM MODERATOR

5-10 minutes. Presentation given by Session moderator

- Agenda
- Ground rules for the meeting

- *Agenda*

Present agenda for the meeting: general presentations about the project and communities of practice + roundtable with a focus on identifying objectives for Berlin DWC and mapping actors and stakeholders to be engaged

- *Ground rule for the meeting (rules for dialogue)*

We have a common understanding about:

- There are no right or wrong answers – there are many possible realities → all contributions and perspectives are appreciated.
- Our goal is to build a “win-win” collaboration between research and practical knowledge. This implies a two-way collaboration.

→ Stakeholders are asked to:

- Provide support to innovators
- Identify how DWC can provide support to them
- We are ready to let go of our own determinations and find a broad consensus

P3.- OVERVIEW OF DIGITAL SOLUTIONS TO BE IMPLEMENTED IN THE CITY

10 minutes. Presentation given by DWC City Leader

- Brief description of the innovations to be implemented in the city
- Planning for implementation of each digital solution: schedule, sites, testing plan, targets...

P4.- CONCEPT OF COMMUNITIES OF PRACTICE IN DWC

5-10 minutes. Presentation given by Session moderator

- Concept of local CoPs in DWC
- IP CoP and TP CoP
- Next steps

- *The concept of Local Community of Practice in DWC*

Definition of CoP.

Main aim of local CoPs is to provide a space for facilitating the co-development of digital solutions. Co-development should increase the chances of producing innovations readiness and their adoption by end-users. Co-development is based on a collaboration:

- where innovators benefit from data and information and testing and development in practical contexts and
- end-users benefits by getting their needs and requirements (general and related to specific routines linked to daily work) incorporated into the development of solutions.
- *Other CoPs in DWC*
 - Another 4 Local CoPs in Copenhagen, Milan, Paris and Sofia
 - 1 Intra-project CoP: where Local CoPs leaders are represented (transferability and transversal topics)
 - 1 Trans-project CoP: represented by Project Coordinator will organise a limited number of networking activities with other projects and initiatives.
- *Next steps*
 - Tentative vision of the CoP roadmap
 - Feedback from participants

ROUNDTABLE		
Topic 1 (T1): ‘Tour de table’	Short presentation of all participants, including main expectations for DWC	(5 min)
T2: Setting objectives	What can DWC do for me? What can I do for DWC?	(15 -25 min)
T3: Stakeholder mapping	Mapping key stakeholders for each solution (Who do you miss in this room?)	(15 min)
T4: Mapping relationships	How do stakeholders relate among them?	(10 min)

TOPIC 1 (T1).- ‘TOUR DE TABLE’

5 minutes. All

Short presentation of all attendees, institution they represent and main aim for engaging into Berlin DWC and with DWC project.

T2.- SETTING GENERAL OBJECTIVES FOR DWC BERLIN

15 minutes. All

One idea is to hand out two papers to each participants for them to write as bullet points:

- ✓ How do I think DWC can directly benefit to my organisation?
(not limited to co-development of digital solutions, e.g. an organisation may be interested because it increases its visibility)
- ✓ How do I think my organisation can support the development of the innovations?
(only as data/information providers? or is there anything else that can be done?)

Then, we can collect the answers, read them in loud voice and discuss with all the group. The answers will be later summarised and the overall perception of the group shared with all participants.

T3.- STAKEHOLDER MAPPING

15 minutes. All

A preliminary stakeholder mapping has been already prepared by BWB as part of the preparatory work for the organisation of the meeting.

Our suggestion is that you prepare 3 slides (i.e. one slide per each of the 3 innovations dealing with groundwater management) with the following information:

- List of the stakeholders already identified (highlighting in a different colour those participating in the meeting)
- Potential role of each organisation in the co-development of the solutions

Then all the participants can help to complete the list and identify roles for other participants, or indeed, extend their own potential role in Berlin DWC.

T4.- MAPPING RELATIONSHIPS

10-minutes. All

[NOTE: This part could be skipped in case that time is running out or the moderator feels the participants are starting to get tired or losing a good spirit.]

The idea is to ask the participants to identify (for each of the 3 solutions dealing with groundwater management) which stakeholders they think they can collaborate with and which with aim.

In order to make this exercise easier to the participants, a list of possibilities can be displayed on screen (also linking to the transversal topics of DWC). As an initial suggestion these topics could be:

- Sharing data/information
- Improving data interoperability
- Provide support to testing activities
- Enhancing cyber-security
- Increasing public awareness about involvement of the organization in enhancing water sustainability
- Adopting the solution once these are validated in operational environment

- Others...

For example, one organization may be interested in collaborating with another one in terms of improving data interoperability between both of them, benefitting at the same time the development of the innovation.

Again, we would ask the participants to write their answers in paper. Probably there will be not a long time for sharing, but we can prepare a summary graph with all suggested interactions. This graph will provide useful information about the most central actors in terms of suggested interactions [ICA can take care of preparing the graphs].

ANNEX 3. TEMPLATE FOR REPORTING ON LOCAL COP ACTIVITIES

Name for the activity	(e.g. Presentation meeting for Berlin DWC)
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Date	**/**/20**	Place	
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General description of the activity: main aims and objectives

Agenda

Attendance (just add the names of the organizations participating)

Key outcomes of the activity (please describe here the most relevant points expressed by the participants throughout the activity. Also lessons learned and important action points for next activities should be added here)

Particular feedback from the participants about the process (if any) (e.g. perception of usefulness of the activity, feedback about organisation, satisfaction)

Feedback from the organising team (what worked well, what did not work so well)



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