Political and sOcial awareness on Water EnviRonmental challenges GA N.687809

Deliverable Title	D4.8 The potential of Digital Social Platforms in enhancing urban water governance: *Report on the UWCS governance analyses of the Key Demonstration Cities*
Deliverable Lead:	Utrecht University
Related Work Package:	WP4: Environmental, political and social impact of the POWER model
Related Task:	T4.5 UWCS governance in the key demonstration cities
Main Author(s):	Mado Witjes, Stef Koop, Farhad Mukhtarov, Carel Dieperink, Peter Driessen and Kees van Leeuwen
Other Author(s):	Oana Forestier, Chakira Vink, Joseph Pinyol Alberich, Marketa Steflova, Fabian Gomes Monteiro, Laura Schoot
Dissemination Level:	Public
Due Submission Date:	30.11.2019
Actual Submission:	30.11.2019
Project Number	687809
Instrument:	H2020-ICT10-2015
Start Date of Project:	01.12.2015
Duration:	48 months

Abstract	The purpose of this study is to assess the potential of Digital Social Platforms (DSPs) to enhance the governance capacity by facilitating a process of collaborative learning in the Key Demonstration Cities (KDCs) and beyond. The analytical framework applied in this study includes three steps. The first step is the water Governance Capacity Framework (GCF), which is a comprehensive analysis of the main enabling conditions that determine the governance capacity needed to address specific water challenges. The second step is the in-depth case study, which is an analysis of collaborative learning where we specifically focus on how learning takes place among diverse actors, and how a particular socio-economic, political, cultural and technological setting influence the process and outcomes of information sharing and knowledge co-production for dealing with various urban water challenges. The third step includes a reflection on the characteristics and the potential of the DSP to enhance collaborative learning and thereby improve the capacity to jointly govern water challenges in cities.

Versioning and Contribution History

Version	Date	Modified by	Modification reason
v.01	01/04/2019	Stef Koop, Mado Witjes, Carel Dieperink, Peter Driessen	First version current deliverable
v.02	12/07/2019	Christine Ballard, Jeremy Draper, Shimshon Yeshayahu, Jordi Vinyoles Cartanya, David Ribes Lladós, Alex Cameron, Daniel Coles, Janet Riley	Ensuring that all information on the KDCs is correct and up-to-date. Improving the quality of information by providing relevant literature and policy documents. Minimising language errors.
v.03	16/07/2019	Mado Witjes, Stef Koop, Carel Dieperink, Peter Driessen	Improving the document based on constructive feedback from the Key Demonstration Cities
v.04	30/07/2019	Leticia Ozawa-Meida, Darsheet Chauhan, Janet Riley, Ljiljana Marjanovic-Halburd, Daniel Coles	Changing the executive summary and elaborating more on the results and recommendations. Providing recommendations in the conclusions. Clarifying the cohesion of the three steps. Minimising repetition in the KDC chapters. Minimising language errors and changing language to a less academic style.
v.05	29/08/2019	Mado Witjes, Stef Koop, Carel Dieperink, Peter Driessen	Improving the document based on the constructive feedback of project partners. Final version.
v.06	05/11/2019	Leticia Ozawa-Meida	Language corrections and general feedback
v.07		Stef Koop	Final version

Table of Contents

Executive Summary

Over half of the world's population is living in cities and it is expected that by 2050 approximately 6.4 billion people will live in an urban area (IWA, n.d.). Urban, demographic and climate trends are increasingly exposing cities to risks of having too little, too much and too polluted water. With the spread of information and communication technologies urban water governance may undergo prominent changes, especially in terms of knowledge exchange and public engagement. Therefore, this report examines the potential of Digital Social Platforms (DSPs) to enhance urban water governance. DSPs are designed to facilitate new forms of knowledge sharing and communication as they can be used to gather and disseminate detailed place-based information, citizens and expert knowledge and facilitate dialogue between a variety of stakeholders.

This report is the main outcome of Task 4.5 *UWCS governance in partner cities* (M17-M48), as it includes a detailed analysis of water governance in the Key Demonstration Cities (KDCs), namely Leicester, Milton Keynes, Sabadell and Jerusalem. It follows the guidance document for the analysis of water governance in municipalities and regions (D4.7). Governance capacity is understood as ability of governmental and non-governmental actors to work together and jointly address common challenges. The purpose of this deliverable is to assess the potential of DSPs to enhance the governance capacity through a process of collaborative learning in the KDCs and beyond. To reach this objective, an analytical framework is used which consists of a three-step approach. The first step includes a baseline governance assessment following the water Governance Capacity Framework (GCF; D4.7). The GCF is a comprehensive analysis consisting of nine key enabling conditions that determine the governance capacity needed to address specific water challenges. The second step includes the in-depth case study of collaborative learning by scrutinising four of the nine conditions of the GCF: awareness, useful knowledge, continuous learning and stakeholder engagement process. As such, we focus on how collaborative learning takes place among various actors, and how socio-economic, political, cultural and technological settings influence the process and outcomes of information sharing and co-production for dealing with various urban water challenges. Lastly, the third step includes a reflection on the characteristics and the potential of the DSP to enhance collaborative learning and thereby improve the capacity to jointly govern water challenges in cities. The governance capacity analysis and the in-depth analysis of collaborative learning provide the required knowledge to assess the potential role of the DSP to strengthen the four specific governance capacity conditions.

Baseline governance capacity analyses have been conducted in the KDCs to explore the governance barriers and opportunities. Leicester has the most encouraging governance capacity to address flood risk, whereas for Milton Keynes and Sabadell the overall governance capacity was found to be just below slightly limiting. This can be explained by the fact that an initiative to reduce bottled water consumption (Refill) is not yet implemented, which also resulted in a slightly limiting governance capacity to reduce water consumption. In Sabadell, there are various factors that limit the capacity to govern practices of water recycling in the city (e.g. limited coordination between the national and local government). Finally, the governance capacity of Jerusalem was also found to be slightly limiting to address the challenge of water conservation which is due to a low performance on a few conditions such as the involvement of stakeholders.

In addition to the governance capacity analyses, experiences with collaborative learning were examined. In all of the four KDCs, collaborative learning took place between stakeholders. In all of the demonstration cities, information was shared between governmental bodies, citizens and institutions. In some cities, the degree of information sharing was more extensive. For example, in Jerusalem there is an active network between different stakeholder groups whereas in Milton Keynes this was limited. Furthermore, in all of the four cities, conditions were identified which influence the capacity of citizens to participate in information sharing and knowledge production, including a lack of coordination between governmental bodies and incoherency between policies).

The DSP has a high potential to enable more inclusive and effective citizen engagement in water issues throughout Europe and beyond as the examples in the KDCs have demonstrated. To ensure optimal implementation of the DSP it is important that seven conditions are present, which include the following: a local sense of urgency, alignment with existing initiatives and embedment within a wider strategy, effective forms of communication, the presence of a moderator, content providers and ethical guidelines, reliable, transparent and comprehensible information, open access, and the ability of citizens to utilise the DSP.

Our four case studies reveal that DSPs have high potential to ensure effective citizen engagement if the previously mentioned conditions for an optimal use of the DSPs are present. Potential DSP adopters have to take these into account. We therefore conclude with the following recommendations:

1. **Ensure enough political and social support before developing the DSP:** ideally the specific water challenge is a hot topic on both the political and social agenda. If the challenge is not high on the political and/or social agenda, it is recommended that DSP adopters respond to windows of opportunities. Actual flood events could for instance provide an opportunity to raise awareness on flood risk. The DSP can also play a role in this by putting the water challenge at the forefront. The DSP of Leicester for example revolves around the challenge of flood risk, and is used as a tool to communicate and prepare stakeholders on flooding;

2. **Map existing policies:** examine ongoing and recent policies on the specific water challenge in order to find out what has already been done by other actors to address the water issue at the national, regional and local level; the DSP must be embedded in these policies;

3. **Map knowledge gap and needs:** investigate what knowledge stakeholders need to have (knowledge gaps) and what knowledge needs stakeholders have. If a variety of stakeholders are involved, knowledge needs could differ. It is therefore important to put relevant information on the DSP, which has an added value both from the perspective of fulfilling the needs of stakeholders as well as filling the knowledge gap. Furthermore, information on the DSP must be easy to find for stakeholders (e.g. on Google, by using relevant key words);

4. **Create a clear objective for the DSP:** there should be a clear aim for the usage of the DSP as this determines the extent to which the platform is open access. As a starting point it is recommended that all information on the DSP is accessible for everyone, however when the aim is to provoke a discussion on the water challenge registrations could be relevant (e.g. for gamification elements and the planning of offline debates);

5. **Ensure reliability, transparency and comprehensibility:** to ensure that information that is communicated on the DSP is reliable, transparent and comprehensible there should be an editorial team. There should be an ethical guideline to ensure that content is productive and meaningful. Ethical guidelines can be used that are available on other online platforms (e.g. Facebook). The editorial team should regularly check whether the content on the DSP meets these guidelines;

6. **Reflect on representativeness:** critically reflect on the stakeholders that are active on the DSP and whether they are representative for a whole community. As the DSP aims to be a tool for democratic participation, it should be examined whether this is also the case in practice (e.g. if the information that is communicated fulfils the needs of all stakeholder groups and whether the comments placed on the DSP are representative for these groups). Although the DSP can be a tool to communicate information and evoke discussions, it is not a replacement of council meetings.

List of acronyms

ACA	Catalan Water Agency
CASSA	Companyia d'Aigües de Sabadell (Water company in Sabadell)
C2G	Citizens to Government
C2C	Citizens to Citizens
DEFRA	Department for Environment, Food and Rural Affairs
DMA	District Measurement Area
DSPs	Digital Social Platforms
EA	Environment Agency
GCF	Governance Capacity Framework
GPS	Geographical Positioning Systems
GwC	Government with Citizens
G2C	Government to Citizens
ICT	Information and Communication Technology
IWA	Israeli Water Authority
JDC	Joint Distribution Committee
KDCs	Key Demonstration Cities
LCC	Leicester City Council
LCCs	Local Community Centres
LLFA	Lead Local Flood Authority
LRF	Local Resilience Forum
MKC	Milton Keynes Council
NCGSC	National Community Gardens Steering Committee
NFM	Natural Flood Management
MAVTI	Jerusalem Company for Sewage and Treatment Plants
NGO	Non-Governmental Organisation
NPR	Non-Potable Recycled water
NRW	Non-Revenue Water
RFCC	Regional Floods and Coastal Committee
SPNI	Society for Protection of Nature in Israel
SuDS	Sustainable Urban Drainage Systems
STW	Severn Trent Water Ltd
TRT	Trent Rivers Trust
WFD	Water Framework Directive
WRAP	Waste and Resources Action Programme

1   Introduction

1.1   Aim of this report

POWER is a user-driven project that aims to share the knowledge of and experience on water scarcity, security, quality, and water consumption-related issues in different local authorities in the EU and beyond. The European Partnership on Water (EIP Water) identified eight priority areas which were believed to have the most important impact on the future of water. The POWER project addresses four of these priorities and acknowledges the importance of smart technology. Digital Social Platforms (DSPs) have been developed which facilitate the sharing of progress, knowledge, opinions and best practices of four key demonstration cities. DSPs can facilitate new forms of knowledge sharing and communication as they can be used to gather and disseminate detailed place-based information, citizens and expert knowledge and facilitate dialogue between varieties of stakeholders.

This deliverable aims to assess the potential of DSPs to enhance the governance capacity through a process of collaborative learning in the Key Demonstration Cities (KDCs) and beyond. Based on the knowledge of previous tasks, the guidance document (D4.7) described an approach to analyse the governance aspects of each of the KDCs and explore opportunities for DSPs to contribute in the process of addressing water issues. To reach the objective of this deliverable, an analytical framework is used which consists of a three-step approach. The first step includes a baseline governance assessment following the water Governance Capacity Framework (GCF; D4.7). The GCF is a comprehensive analysis consisting of nine key enabling conditions that determine the governance capacity needed to address specific water challenges. The second step includes the in-depth case study of collaborative learning by examining four of the nine conditions of the GCF: awareness, useful knowledge, continuous learning and stakeholder engagement process. As such, we focus on how collaborative learning takes place among various actors, and how socio-economic, political, cultural and technological settings influence the process and outcomes of information sharing and co-production for dealing with various urban water challenges. Lastly, the third step includes a reflection on the characteristics and the potential of the DSP to enhance collaborative learning and thereby improve the capacity to jointly govern water challenges in cities. It is key to have a proper understanding of the current interactions between stakeholders in order to ensure optimal DSP application in Europe's municipalities and regions as well as reflecting on the role and potential that DSPs could have. The governance capacity analysis and the in-depth analysis of collaborative learning provide the required knowledge to assess the potential role of the DSP to strengthen the four specific governance capacity conditions.

The four key demonstration cities include Milton Keynes (United Kingdom), Leicester (United Kingdom), Sabadell (Spain) and Jerusalem (Israel). First, Milton Keynes has been identified as an area of severe water stress, which impacts the city's ability to expand and its resilience to future climate change impacts. Therefore, the city council is seeking ways to reduce water consumption. Within this deliverable, the focus is on the reduction of bottled water consumption in Milton Keynes as an example of water conservation behaviour. Second, Leicester has been identified as a city at risk of surface water flooding. The DSP helps the city council in achieving its flood risk management strategy objectives. Within this deliverable, Sustainable Urban Drainage Systems (SuDS) is examined as an approach for managing surface water for flood control. Third, Sabadell supplies water in two qualities: drinking water and water for non-drinking purposes. CASSA, the local water utility, aims to reduce the consumption of drinking water by replacing it with treated wastewater. Therefore, this deliverable focusses on reusing treated wastewater in Sabadell. The last key demonstration city is Jerusalem. The main goal for the city of Jerusalem is to promote water conservation behaviours, achieve quantifiable water savings and improved awareness regarding water quality. Therefore, with regards to Jerusalem, this deliverable focuses on water conservation in community gardens.

1.2   Document outline

Following from this introduction, the analytical frameworks applied are described in section 2. First, the Governance Capacity Framework (GCF) is introduced as a general governance assessment framework. Second, the in-depth case study approach is explained that focuses on four main conditions of the GCF and explore them with respect to DSPs. Third, a typology of Information and Communication Technology (ICT) enabled interactions is discussed, which forms the basis to assess the potential of the DSPs in the KDCs. In sections 3, 4, 5 and 6 the results are discussed regarding the governance analyses and the potential role of the DSPs to address the water challenges. Finally, in the last section conclusions and recommendations are provided to ensure an optimal DSP application in Europe's municipalities and regions. In Annex 1, an overview is given on the output of this deliverable in the form of peer-reviewed articles. The publications are structured along the chapters of this report. Annex 2 provides an overview of publications on governance capacity analyses in follower cities. These cities share similar water challenges as the KDCs and have been selected from the City Blueprint network, NetwercH20 and cities that signed the Dubrovnik declaration of intent. In the latter declaration, cities declared their intent to form part of a learning alliance and a community of best practices for water (NetwerchH20, 2015). Annexes 3 and 4 provide a list of interviews that are conducted within the KDCs.

2   Analytical Framework: A three-step approach

This chapter presents the three-step approach that is applied in this research. First, section 2.1 discusses the water Governance Capacity Framework (GCF), as an assessment of the baseline governance situation. Second, section 2.2 explains the in-depth case study analysis of collaborative learning between citizens, local authorities and a multiplicity of other stakeholders that is applied in the KDCs. Subsequently, section 2.3 discusses the typology of ICT-enabled interactions, which forms the basis to assess the potential of the digital social platforms in the KDCs. For all of the previously mentioned approaches, explains how data are collected and analysed. The governance analyses of the KDCs (sections 3, 4, 5 and 6) follow the same order as presented in this section, namely: water governance capacity analysis; (2) collaborative learning analysis, and (3) assessment of the potential of the DSP.

These three steps are selected as a way to analyse the governance aspects of the four KDCs and explore opportunities for the DSP to contribute in the process of addressing water-related challenges. We use these three steps as they include separate, but complementary components (see D4.7 for a detailed description of the analytical framework). The first step is the GCF, which uses a positivistic approach to provide a more general overview of the main barriers and opportunities for cities to increase their governance capacity to address the water-related challenge. The second step is the in-depth case study approach, which builds upon the GCF, in particular on the following four conditions: awareness, useful knowledge, continuous learning, and stakeholder engagement process. These four conditions are the starting point for the in-depth study on how collaborative learning takes place in the KDCs. This step uses a constructive approach based on the in-depth and contextual understanding of multifaceted interactions between a variety of stakeholders. The third and last step, assessment of the potential of the DSP, can only be conducted with the knowledge that is obtained in the prior two steps. The governance capacity analysis and the in-depth analysis of collaborative learning provide the required knowledge to assess the potential role of the DSP to strengthen the four specific governance capacity conditions.

2.1   Step 1: Water Governance Capacity Framework

DSPs may have the potential to be useful in enhancing collaborative learning, provided that they are well embedded in the local governance context and address the specific governance issues at hand. Because these governance issues have unique features for each city or collaborative entity, there is no one-size-fits-all solution. DSPs need to contribute optimally to a broader collaborative structure and should address existing barriers in order to contribute to local decision-making processes. The GCF provides a comprehensive overview of the key governance conditions that may encourage or limit the governance capacity to address the water challenge that a city faces. The framework serves as a knowledge translator that enhances cities to share knowledge, experiences and best practices, and serves as a basis to explore the most feasible opportunities and strategies for applying DSPs in policy design, execution and monitoring stage. The following explorative research questions are formulated that are being elaborated and specified with respect to ICT application in the in-depth case studies:

1. Who are the most relevant stakeholders? What are their interest and problem definitions? Which collaborative alliances do already exist?
2. Which governance conditions and indicators are most encouraging and limiting the governance capacity to address the water challenge in each of the four partner cities?

Nine conditions for good urban water governance are identified and classified according to three dimensions: knowing, wanting, and enabling (Koop et al., 2017). The "knowing" refers to the need to be fully aware, understand, and learn risks and impacts of actions, policy, and strategies. The "wanting" dimension refers to the actors need to commit to cooperate, and act upon ambitions, and apply their skills to finding solutions.

The "enabling" dimension was created because actors need to have the network, resources, and instruments to enable them to implement their ambitions. The framework has nine governance conditions. An in-depth study of the scientific literature regarding environmental governance and adaptive governance yielded three indicators for each condition (Koop et al., 2017). The results are shown in Table 1. We provide more detail on each of these conditions and indicators in Annex 2 of deliverable 4.7.

Table 1 Governance Capacity Analysis framework

Dimensions	Conditions	Indicators
Knowing	**1. Awareness**	1.1 Community knowledge
		1.2 Local sense of urgency
		1.3 Behavioural internalisation
	2. Useful knowledge	2.1 Information availability
		2.2 Information transparency
		2.3 Knowledge cohesion
	3. Continuous learning	3.1 Smart monitoring
		3.2 Evaluation
		3.3 Cross-stakeholder learning
Wanting	**4. Stakeholder engagement process**	4.1 Stakeholder inclusiveness
		4.2 Protection of core values
		4.3 Progress and variety of options
	5. Management ambition	5.1 Ambitious and realistic management
		5.2 Discourse embedding
		5.3 Management cohesion
	6. Agents of change	6.1 Entrepreneurial agents
		6.2 Collaborative agents
		6.3 Visionary agents
Enabling	**7. Multi-level network potential**	7.1 Room to manoeuvre
		7.2 Clear division of responsibilities
		7.3 Authority
	8. Financial viability	8.1 Affordability
		8.2 Consumer willingness to pay
		8.3 Financial continuation
	9. Implementing capacity	9.1 Policy instruments
		9.2 Statutory compliance
		9.3 Preparedness

Data collection and analysis

Each of the 27 indicators that are listed in Table 1 have a pre-defined question and a Likert scoring system that ranges from very encouraging (++) to very limiting (--) the overall governance capacity (Koop et al., 2018).

By substantiating the scores of each of the 27 indicators according to a triangular approach, the findings are validated in a standardised, transparent and reproducible way. This approach includes three steps:

1. A desk study of scientific literature, policy documents and grey literature provided a substantiated preliminary Likert score of each indicator in each individual study;

2. The construction of a standardised importance/influence matrix to identify stakeholders, categorise them, and specify their roles and responsibilities (DFID, 2003). In this matrix, importance refers to the priority given to satisfy the needs and interests of a different stakeholder. Influence relates to the power of stakeholders to influence a policy, plan or objective. The importance/influence matrix includes four categories: (1) crowd (low importance and low influence); (2) context (low importance and high influence); (3) subjects (high importance and low influence); and (4) key players (high importance and high influence). For each class, at least one stakeholder was selected from the government, the market and civil society, as suggested by Lange et al. (2013). Within these stakeholder figures, all stakeholders have numbers that correspond to the stakeholder analysis tables. A coding system is applied in this deliverable to refer to maintain anonymity, where [SR001], [SR002], [SR003] refer to the conducted interviews. In total 67 interviews were conducted in the key demonstration cities, and 93 interviews in follower cities. A list of interviews is provided in Annex 3. The interviews were conducted face-to-face, lasted about one hour each and were in most cases recorded to increase the accuracy of the information gathered. The pre-defined questions that are listed in Annex 3 and are the basis of this analysis. In the interviews, questions were reformulated in according to the person's background. The scores were determined based on the preparatory desk study, interviews, and additional collection of reliable and accessible information (Koop et al., 2018). After signing the informed consent, the interviewees were anonymously referred to in the text in order to protect personal information and in order to avoid socially desired answers. Interviewees are referred to by the first letter of their city and the acronym GC (Governance Capacity). For example interviewee 1 in Leicester is referred to as: L.GC:1.

3. All interviewees were asked for their feedback to the indicator scores substantiation and their respective explanations. Their feedback took the form of additional information. In addition, interviewees were asked to support their statements with reports, policy references, arguments, etc. Based on the incorporation of this additional input, the final indicator scores were determined.

In the next section, we detail our approach for analysing collaborative learning for each of the KDCs. The interpretive approach builds upon the GCF, especially four key governance conditions researched in this part – awareness, useful knowledge, continuous learning and stakeholder engagement process.

2.2   Step 2: Collaborative Learning

Besides the efforts to analyse the governance capacity in each of the KDCs, an in-depth case study analysis of collaborative learning in the demonstration cities is conducted. As mentioned previously, the in-depth case study approach builds upon the GCF, especially four conditions are researched in this part: awareness, useful knowledge, continuous learning and the stakeholder engagement process. Taking these four conditions as a starting point, the in-depth case study analysis examines how collaborative learning takes place within the four cities. Collaborative learning is both a process of interaction which produces trust and social capital and

the products of learning, such as projects, changes in behaviour and progress towards achieving a goal in water management. An in-depth case study approach helps to understand how a specific governance context influences collaborative learning. In this document, experiences with collaborative learning in the KDCs are examined in a specific setting, namely during the emergence and implementation of a policy innovation. A policy innovation is defined here as a "programme, idea or practice that is new to the government adopting it" (Walker, 1969, p. 881). In the KDCs the following policy innovations are examined. First, in Leicester the Sustainable Urban Drainage System (SuDS) is a policy innovation for managing surface water for flood control and water and environmental quality reasons. Second, in Milton Keynes the project Refill is examined as an example of water conservation behaviour. Refill is a programme that aims to reduce the consumption of single-use water bottles. Third, the policy innovation examined in Sabadell is the reuse of treated wastewater in order to reduce water stress. Lastly, in Jerusalem it is examined how community gardens can conserve water.

The framework developed by Gerlak and Heikkila (2011) and Heikkila and Gerlak (2013) is useful in structuring experiences with collaborative learning in the KDCs. The following research questions are formulated which are elaborated in the in-depth case studies:

1. Is there a process of collaborative learning and information sharing between citizens and local authorities with the focus on co-production of knowledge and trust?
2. In what way do social, economic, cultural, political and technical conditions influence the capacity of citizens to participate in a) information sharing; and b) knowledge co-production in a particular area and issue?

Figure 1 presents a modified version of the framework by Heikkila and Gerlak (2013) that guided the data collection and analysis. Exogenous factors were omitted from Figure 1, such as political, social, and economic changes suggested by Heikkila and Gerlak (2013), but here discussed as part of the broader "institutional structure". The framework is developed to study the products and processes of learning. By focusing on "what" has been learned by individuals in a collaborative setting and "how", and on the "impact" of such learning in terms of "products of learning", the framework allows the connection of learning with the policy outcomes. Gerlak and Heikkila (2011, p. 5) define collaborative learning process as "acquiring information through diverse actions (e.g. trial and error), assessing or translating information, and disseminating knowledge or opportunities across individuals in a collective". They define collaborative learning products as "new shared ideas, strategies, rules, or policies" that emerge from the collaborative learning process (Gerlak & Heikkila, 2011, p. 5).
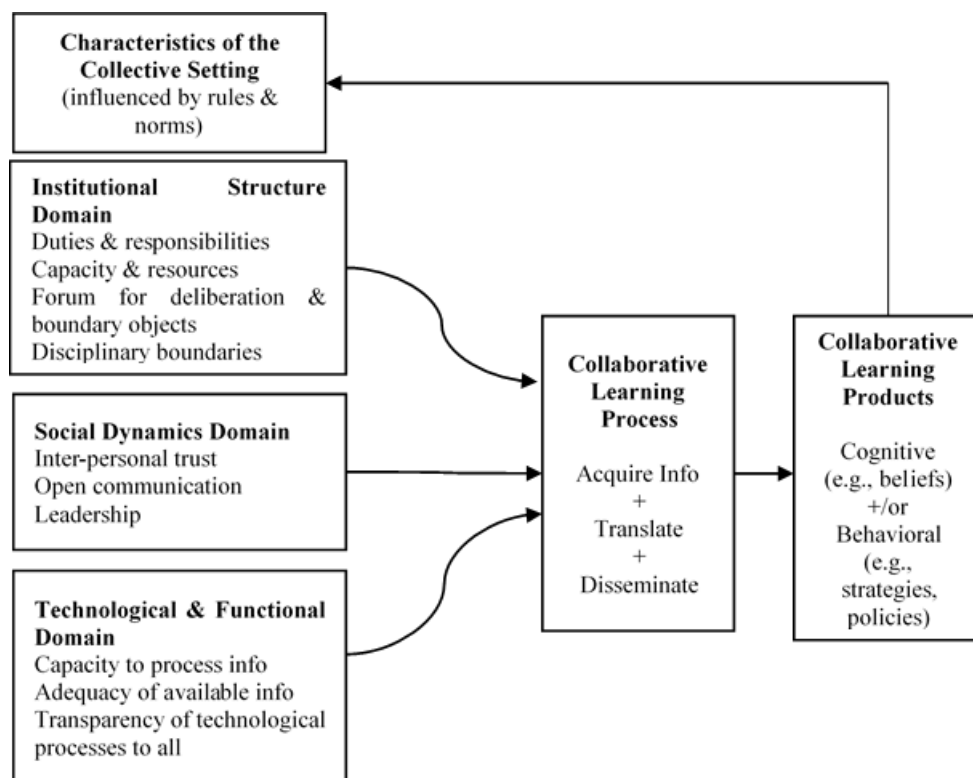
Figure 1 Conceptual Framework for Understanding the Emergence and Implementation of Policy Innovations in Collaborative Learning Settings (based on Heikkila and Gerlak, 2013)

The collaborative learning process involves a set of phases, including: acquisition, translation, and dissemination of knowledge and experience. These phases explain how learning emerges. Firstly, acquisition involves the collection of information. Secondly, the translation phase of the learning process includes interpreting the meaning of new information or the use of existing information in a new situation. In this phase, information is processed into knowledge. However, even when knowledge is acquired and translated it does not necessarily lead to the acceptance and adoption of the idea by all members of the group. The last phase involves the dissemination of knowledge. Through dissemination knowledge on an individual level is likely to be developed into shared knowledge among group members (Heikkila & Gerlak, 2013).

The abovementioned phases of the learning process provide mechanisms that produce learning products. This can involve cognitive changes, which can include new or strengthened ideas, beliefs or values. Another type of learning product can involve changes in collective behaviours, which can range from new or enhanced strategies, programmes, rules or sets of institutional arrangements and policies. Behavioural changes can also include the adoption of a new media campaign that reframes a policy debate (Heikkila & Gerlak, 2013).

Furthermore, three sets of contextual factors can potentially influence collective learning: the institutional structure, social dynamics and the technological and functional domain. First, the structure is defined as "who participates in the collective, what roles different actors play, and how those roles are organised or structured" (Heikkila & Gerlak, 2013, p. 497). For instance, in the case of community gardens it is important to understand who the members are and what their roles are, as this can potentially influence collaborative learning. Second, social dynamics which consists of interrelationships and communication patterns within the collaboration and include "levels of trust and conflict between actors, as well as actors' shared understanding of communication, such as language and values such as tolerance for or openness to dialogue and contestation" (Heikkila & Gerlak, 2013, p. 497). Third, the technological and functional domain, which involves "the types of technical or substantive activities (e.g. services, products, and outputs) produced by a

group, along with the information and technological resources and tools (e.g. databases, research, information systems, and communication infrastructure) that actors draw upon in undertaking these activities" (Heikkila & Gerlak, 2013, p. 497). Digital social platforms are included in this domain.

It is important to mention that there are various approaches to learning in literature, including abundant literature on "social learning" (Benson et al., 2016; Pahl-Wostl, 2009; Newig et al., 2017). Such learning often starts with cognitive and behavioural changes in an individual (Muro and Jeffrey, 2012: 3) and can lead to "social or institutional transformation at the group level" (Gerlak and Heikkila, 2011: 3). Rodwin and Schon (1994) have further suggested that social learning may be the major pre-requisite of bottom-up policy innovations through collaborative improvisation and finding creative solutions to pressing problems. We acknowledge the complexity of the debate on learning and policy change, and choose to build on the collaborative learning framework of Gerlak and Heikkila (2011) and Heikkila and Gerlak (2013), as visualised in Figure 1, due to its comprehensive and clear structure and attention to the learning processes, products and policy change as well as contextual factors that enable or inhibit such change.

Data collection and analysis

Multiple methods were used to collect the data necessary to analyse how collaborative learning takes place in the KDCs. Similar methods are used as for the governance capacity (Section 2.1; data collection and analysis) as the research on collaborative learning also includes a desk study of scientific literature and policy documents and semi-structured interviews. Semi-structured in-depth interviews were conducted with stakeholders in the KDCs. The method to select the stakeholders has been to systematically analyse what potential parties and institutions can be relevant to the research, making a list and then selecting what stakeholders can be effectively contacted. This method has been complemented with the method popularly known as the snowball effect, where starting from an initial state of a moderate number of contacts to interview, the stakeholder pool to contact becomes larger by asking to previously interviewed stakeholders for more potential names to interview. This second process has been especially relevant to contact activists and members of non-governmental organisations to find alternative opinions that would contrast to the views given by governmental stakeholders. Interviewees were asked to sign informed consents, and they are anonymously referred to in the text. Interviewees are referred to by the first letter of their city and the acronym CL (Collaborative Learning). For example, interviewee 1 in Leicester is referred to as: L.CL:1. A list of interviews in provided in Annex 3. The interviews were in most cases conducted face-to-face, and lasted approximately one hour each. The interviews were recorded to increase the accuracy of the information gathered. Subsequently, interviews were transcribed using qualitative data analysis programs, such as NVivo. The interview protocol has been designed in accordance with Figure 1. After the interviews, all respondents received the transcript and were asked for additional comments. Their feedback took the form of additional information which was incorporated into the final collaborative learning analysis.

Interviews were complemented with observations. For instance, in the case of Leicester, ethnographic observations, participant observations and shadowing of a key policy actor (for one day) took place. Similarly, in Milton Keynes participant observation took place for two weeks at the city council. It entailed being present at one meeting and several discussions with a staff member of the Council's sustainability team involved in setting-up a project in Milton Keynes. These conversations led to a sharper understanding of the current stage at which the project is in Milton Keynes and what knowledge related to this project the Council staff would find useful.

Between the KDCs there are some differences in the applied methodology. For example, in Sabadell two workshops were recorded since within these workshops there were debates with relevant stakeholders on water governance. In the study of Milton Keynes, a comparative case study strategy was selected since the collaboration for setting-up Refill in Milton Keynes is still at a very early stage. Therefore, three established

Refill initiatives were studied in order to draw knowledge that might be useful to the successful implementation of the initiative in Milton Keynes. The cities were selected based on similarities of their exogenous characteristics with Milton Keynes (see Table 2).

Table 2 Details of the four cities that were studied in the comparative case study on Refill

	Milton Keynes	**Norwich**	**Colchester**	**Oxford**
County	Buckinghamshire	Norfolk	Essex	Oxford shire
Region	South East England	East of England	East of England	South East England
Population	255,000	213,000	180,500	155,000
Water Company	Anglian Water	Anglian Water	Anglian Water	Thames Water

In the next section, the potential role of the digital social platforms is discussed based on a typology of ICT-enabled interactions.

2.3 Step 3: Potential role of the DSPs

With the rapid spread of ICT, one could argue that the intensity and nature of public participation in water governance has changed. A widely applied definition of public participation is "the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberately included in the future" (Mukhtarov et al., 2018). Linders (2012) developed a valuable typology of information can flow from a Citizen to a Government (C2G), from a Government to a Citizen (G2C), and from a Citizen to a Citizen (C2C). This framework has been modified by Mukhtarov et al. (2018) through the addition of a fourth type of interaction: "Government with Citizens" (GwC). In this type of interaction, government officials "regularly meet citizens to discuss and develop policy options with the use of ICT technologies (Mukhtarov et al., 2018, p.2). This type of interaction has been added to ensure that the entire spectrum of joint planning approaches is accounted for. See Table 3 for an overview of ICT-enabled interactions with relevance to public service provision.

Table 3 A classification of ICT-enabled citizen-government and citizen-citizen interactions regarding public service provision (retrieved from Mukhtarov et al., 2018)

	Citizens to Government "Citizen sourcing" (C2G)	**Government to Citizens "Government as platform" (G2C)**	**Citizens to Citizens "Do It Yourself Government" (C2C)**	**Government with Citizens "Collaborative planning & groupware" (GwC)**
Description of interaction	Citizens share their opinion among themselves and with government for planning purposes. Citizens provide intelligence to government to identify	Government supplies data for informed decisions by citizens. Government discloses data to win trust and legitimacy of the public. Government uses	Citizens self-organise to produce and consume services with no or little involvement of the government. Online citizen testimonials, sharing	Joint discussion of problems and solutions in workshops with visualising tools and scenario building, training of citizen scientists. Cultivating engaged

	and fix emerging problems	decision heuristics to encourage sustainable behaviour of citizens	of sustainable practices, online advocacy for justice	citizens with on-going face-to-face contact with government representatives
Traditional examples	Town hall meetings, letters, election boards, park volunteer, charter schools, emergency services	Academic alliance, embedded community health workers, bill boards, government newspapers	Word of mouth, private schools, carpooling, activist meetings	Community volunteers and neighbourhood watch, participatory modelling
ICT examples	eRulemaking, IdeaScale, eDemocracy party, CrisisCommons, Challenge.gov, PeerToPatent, SeeClickFix	Geographical Positioning Systems (GPS), GovOpen Sourcing Data.gov, Recovery.gov	Open Source, SETI@HomeYelp, NHS Choice, Email, Community websites, social media	"CommunityViz" software tool for planning, weather networks funded or facilitated by government, virtual learning platforms, touch-tables and visual scenario-building

The first type is 'citizen sourcing', this is when citizens help the government to be more reactive and effective (Linders, 2012, p. 447). Although citizens contribute with their knowledge, the government has the task to manage systems and services (Fung et al., 2013). The second type of interaction is 'government as a platform' (Mukhtarov et al., 2018). In this type, the government communicates information and knowledge to citizens, and in this way the government supports citizens to improve their productivity or achieve their goals (e.g. more sustainable water consumption). This may not seem as a form of public participation, but it can play an essential part in establishing an open, transparent and trust-worthy government. Governments can for instance use DSPs to transparently communicate about their activities as a way of information disclosure, which in turn can lead to more trust and legitimacy. The third type is the 'Do It Yourself Government', where citizens self-organise to produce and consume services with no or little involvement of the government. Citizens can share valuable information with each other through for instance social media and virtual learning platforms, which potentially substitutes traditional government duties to protect and help citizens (Palen & Lieu, 2007). The fourth type of interaction is "Collaborative Planning & Groupware', which refers to "ICT-introduced participatory forms of planning with face-to-face interaction between citizens and a government representative" (Mukhtarov et al., 2018, p. 3). In this type, ICT plays an essential role in facilitating and qualitatively shifting interactions. Examples include participatory modelling and a neighbourhood watch.

The typology as presented in Table 3 explains the potential interactions that can take place on the DSPs. The following questions are formulated which guides the research on the potential role of the DSPs to address a variety of water challenges:

1. What are the key characteristics of the digital social platforms in the KDCs?
2. What potentials and barriers can be identified in the practical application of the DSPs?
3. How can the DSP be enhanced in order to ensure effective citizen engagement in the KDCs and beyond?

Data collection and analysis

In order to answer the research questions, multiple methods have been applied to collect the required data. First, a desk study was conducted on the key characteristics of the DSPs. Examining the content of the DSP gave insights into the features of the platform. Furthermore, the outcomes of the semi-structured interviews that were held to obtain an understanding of the governance capacity and how collaborative learning takes

place were used to examine the potential role of the DSP to address the water challenges. Based on these results and stakeholder opinions, recommendations were developed.

3   Water governance, learning and the potential role of a DSP in Leicester

This chapter presents the results of the governance analysis of Leicester. First of all, the capacity to govern flood risk in Leicester is analysed using the Governance Capacity Framework. Building on this baseline, an in-depth case study analysis of the pre-conditions for collaborative learning follows. Finally, the potential role of the POWER DSP to address flood risk is examined.

3.1   Leicester's governance capacity to address flood risk

In this section the capacity to govern the challenge of flood risk is analysed based on the Governance Capacity Framework (see Table 1).

Leicester is a city in the East-Midlands region of England, United Kingdom. The population of the city is estimated at 348,300 in 2015 (Office for National Statistics, 2016). Leicester is a multi-cultural city and, besides English, over 70 languages are spoken (LCC, 2011, p.3). Leicester is a unitary authority and is responsible for all local government services within city. For flood risk governance, this implies that Leicester City Council (LCC) is the Lead Local Flood Authority (LLFA). This is different than in many other suburban areas in England that have a two-tier system, where some government services are delivered by the lower tier or upper tier authorities of districts and county councils. The Environment Agency (EA) states that in Leicester: "thresholds of fluvial flooding are between the 1-in-10-year (10%) and a 1-in-20-year (5%) chance of flooding each year" (Environment Agency, 2016, p.5). Analysis shows that "the floodplain is relatively levelled with approximately 1,915 residential and commercial properties at risk from a 1 in 75 year (1.33% chance of flooding each year) event" (Environment Agency, 2016, p.5).

The main watercourse in Leicester is the River Soar, which flows from the south to the north of the city, and joins into the River Trent south of the city of Nottingham. The Grand Union Canal also flows through the city and is inter-connected to the River Soar. Throughout the city there are several tributaries of the River Soar, which are classified as ordinary watercourses, seven of which are managed in accordance with the LCC Surface Water Management Plan (LCC, 2012a). Across the city, the surface water sewerage systems and watercourses are largely connected (LCC, 2011, p.3).

Key stakeholders involved in flood risk management

In Leicester, the governance and management of flood risk issues involves various stakeholders, each with different responsibilities and chances of being affected by possible flood hazards. Main rivers and their management and maintenance and thus their flood management, are the responsibility of the Environment Agency (EA); an executive non-departmental public body, sponsored by the Department for Environment, Food and Rural Affairs (DEFRA). Moreover, smaller streams and brooks are classified as ordinary watercourses and are under management of the LLFA (LCC). Additional responsibilities of LCC are:

- Managing surface water and groundwater flooding;
- Developing a local strategy for flood risk management;
- Maintaining a register of flood risk assets;
- Investigating significant flooding incidents;
- Promoting Sustainable Drainage Systems (SuDS);
- Highway authority (managing highway drainage and roadside ditches);
- Cooperating between flood risk management authorities (LCC, 2015b, p.5).

The main department of LCC responsible for flood risk management is the Flood and Drainage Team, which is a sub-department of the Highways Department. Being a unitary council, LCC also has the statutory role of Lead Planning Authority. The Planning department is mainly involved in promoting sustainable urban drainage systems (SuDS), and by this also developing a green space infrastructure. The Planning department also collaborates with the LLFA to investigate flood risk at development sites, as is obligatory under the under

the Flood and Water Management Act 2010. The planning and management of emergencies and thus flood incidents are completed by LCC, Emergency Management department. Other departments involved are Parks and Open Spaces, who manage the riversides and green corridors, and oversee voluntary initiatives on the river. Finally, the management of public sewerage infrastructure and investigating the causes of sewer flooding, is the responsibility of the private water company Severn Trent Water Ltd (STW).

The Trent Rivers Trust (TRT) is a charitable organisation, "which seeks to conserve, protect and enhance the rivers and streams of the Trent catchment" (Trent Rivers Trust 2017b), they also account for the tributaries of the Trent, and thus the River Soar. TRT initiated the River Soar Catchment Partnership, which coordinates the Catchment Based Approach for the River Soar in Leicester (River Soar Catchment Partnership, 2017). The Catchment Based Approach is a policy set out by DEFRA, which aims at "collaborative working at a river catchment scale to deliver cross cutting improvements to our water environments" (Catchment Based Approach, 2017). The River Soar Catchment Partnership is funded by DEFRA and EA. As part of the research, a stakeholder analysis was made, as presented in Table 4 and Figure 2.

Table 4 Overview of stakeholders associated to Leicester's efforts to address flood risk

Governance Level		Urban Water Governance Stakeholder	Societal Layer	Description of task in water governance sector
National	1	Environment Agency (EA)	State	The EA was established in 1996 (to supersede organisations including the National Rivers Authority) to protect and improve the environment. The agency is an executive non-departmental public body. The management and maintenance of main rivers are the responsibility of the EA, including flooding.
	2	Department for Environment, Food and Rural Affairs (DEFRA)	State	The UK government consists of 25 ministerial departments. DEFRA department plays a major role in people's day-to-day life, and is the department that sponsors the EA and set out the Catchment Based Approach policy.
	3	Insurance companies (Flood Re)	State	A property owner in Leicester is more at risk for flooding, and therefore insurers may need to charge higher insurance premiums. The UK government has been working with insurers since 2000 to help make flood risk insurance more affordable. Flood Re is a joint initiative between the government and insurers to make the flood cover part of household insurance policies more affordable.
Regional level	4	Severn Trent Water Ltd (STW)	Market	STW was founded in 1974 and is located in the catchment areas of two of Britain's largest rivers – the Severn and the Trent. It provides drinking water and waste water treatment and operating services to utilities, municipalities and commercial customers. It also supplies water to Leicester.
	5	River Trent Regional Flood and Coastal Committee (RFCC)	State	RFCC is a committee established by the EA under the Flood and Water Management Act 2010 that brings together members appointed by LLFAs and independent members with relevant experience to ensure there are coherent plans for identifying, communicating and managing flood risks, to encourage efficient, targeted and risk-based investment in flood risk management and to provide a link between the EA, LLFAs, other risk management authorities, and other relevant bodies to build understanding of flood risks in the area.

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

	6	Trent Rivers Trust (TRT)	Civil Society	TRT is a charitable organisation which seeks to conserve, protect and enhance the rivers and streams of the Trent catchment. They also account for the tributaries of the Trent, and thus the river Soar.
Leicester Municipal Level	7	Leicester City Council (LCC)	State	LCC is the local government for the city Leicester. The main department of LCC dealing with flood risk is the Flood and Drainage Team, which is a sub-department of the Highways Department.
	8	Local Resilience Forum (LRF)	State	LRFs are multi-agency partnerships made up of representatives from local public services, including the emergency services, local authorities, the NHS (National Health Service), the EA and others. It aims to plan and prepare for localised incidents, such as flooding events.
	9	Residents	Civil Society	Residents of Leicester are at risk of flooding events.
	10	Property and home owners	Civil Society	Similar to the residents, property and home owners are vulnerable to flooding as their homes/properties may be damaged.
	11	Developers	Market	Developers are responsible for implementing sustainable drainage systems (SuDS) in their developments which are beneficial as they manage surface water runoff, act as flood control and provide water and environmental quality improvements.
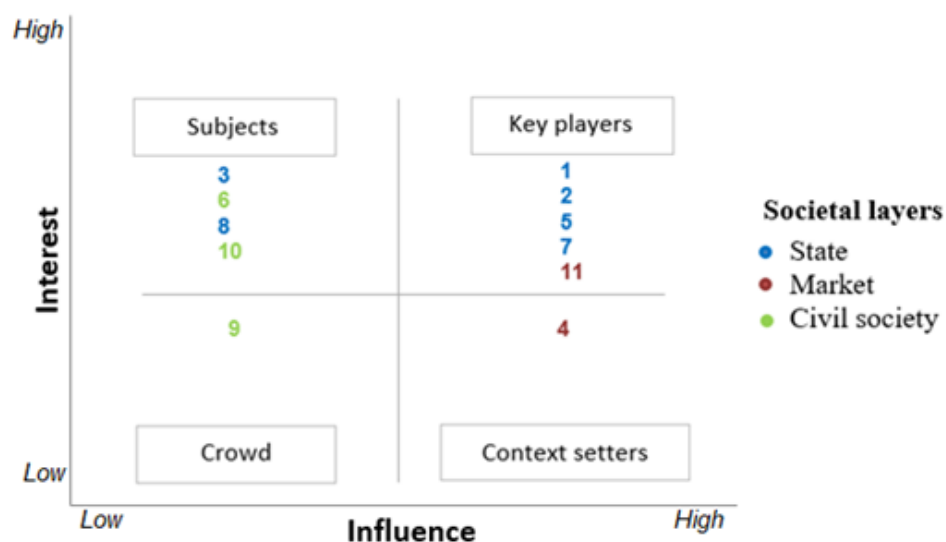
Figure 2 An analysis of the stakeholders involved in flood risk governance in Leicester. The numbers correspond to the stakeholder numbers presented in Table 4

Leicester's governance capacity

In order to address flood risk, the city of Leicester requires sufficient governance capacity. Figure 3 displays Leicester's governance capacity regarding flood risk. This governance capacity integrates the actions of multiple private and public stakeholders responsible for flood risk management in Leicester, thereby showing their shared ability to address the water challenge. Meanwhile, Figure 4 shows the aggregate scores for each governance condition. Subsequently, each condition is discussed more in detail using the 27 indicators.
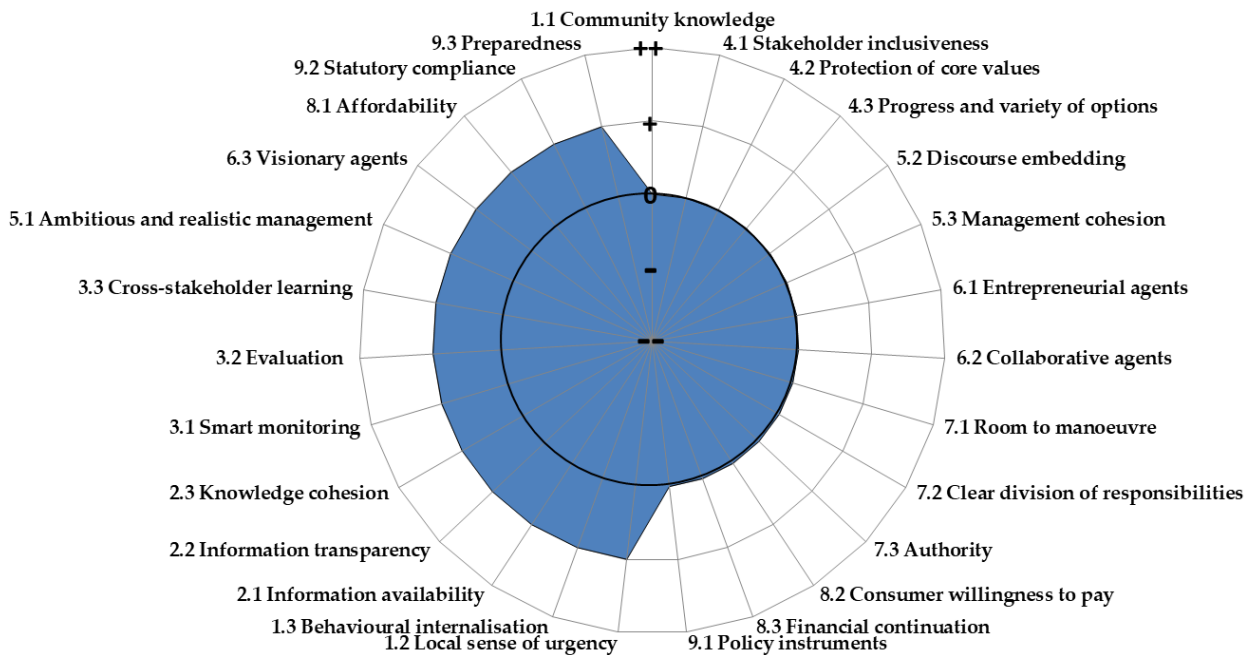
Figure 3 Governance Capacity of Leicester. Depicted are the scores that the city of Leicester received for each of the 27 indicators in respect to flood risk.
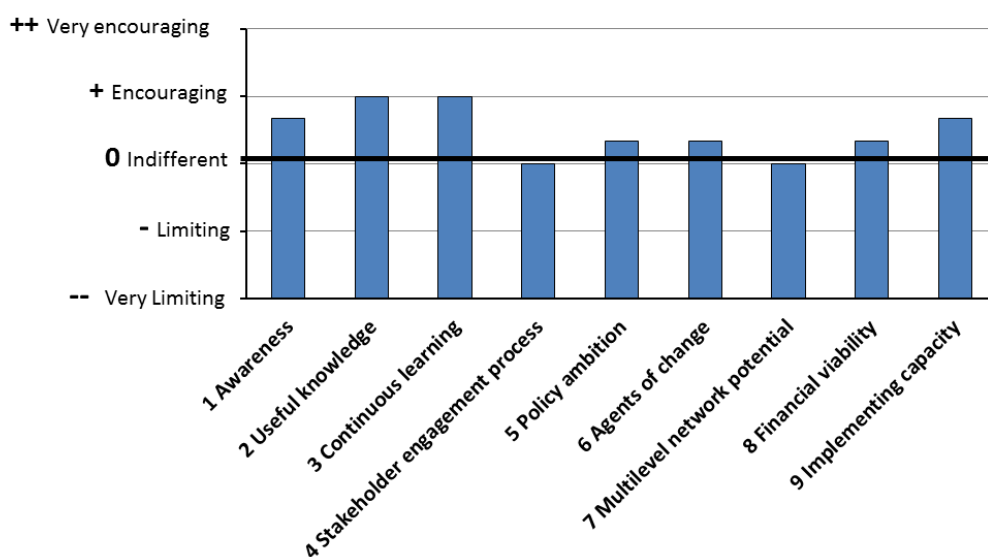
Figure 4 Governance Capacity of Leicester, by each condition. Each condition is the average of the corresponding three indicators, as seen in Figure 3, with respect to flood risk management

Condition 1: Awareness

The effect and impact of flooding is, based on the interviews (L.GC:12; L.GC:3; L.GC:4; L.GC:10; L.GC:11), mostly underestimated by local communities. Awareness-raising campaigns have been set out by the city council's emergency planning department. However, the main constraints are according to one interviewee, (L.GC:5) a "*lack of a framework*" for creating more awareness with the public. Other constraints are that leafleting campaigns were very staff intensive, a transient population in flood-prone areas that did not have a strong connection with the community, and language barriers. There were some good experiences with a school play, which was initiated by the LCC Parks & Greenspaces and River Soar Catchment Partnership, on water issues that was performed by school children (Trent Rivers Trust, 2017a). Involving school children, and by this indirectly reaching their parents, was used as a way to overcome language barriers.

Flood risk is being understated by the local community. Nevertheless, there is a sense of urgency about flood risk among local actors. Flood risk is part of the LCC core planning strategy, also acknowledging the possible future effects flooding can have under climate change (LCC, 2014) or listed as a main issue in the climate change adaptation plan (LCC, 2015a). Also, local politicians are involved with the issue on a regular basis (L.GC:5). Effort is being made by the authority to create more sustainable solutions towards drainage and water retention systems: SuDS. The approach integrates the benefits of increased biodiversity with improved water retention (LCC, 2015c). This could however, be expanded. A main constraint is the limited budget available, which is elaborated on in the 'Financial Viability' subsection.

There have been several attempts to alleviate flood risk by behaviour change. A main constraint for local communities to enable action or change, is their lack of awareness on the issue. For example, the general public can contribute by becoming a flood warden, who alarms their communities and have the ability to create community flood plans. At present, the number of these flood wardens is decreasing, with approximately 20 remaining. Not many members of the general public make changes in their behaviour as a response to flood risk due to irregular occurrence. Usually, only those members of the public who have been affected by a flood in the past, may make changes in their behaviour, their property or try to engage with their local community. From the perspective of policy, changes have been made and there is a well-documented strategy available to all, in the form of the Local Flood Risk Management Strategy (LCC, 2015b), and is embedded into the day-to-day practice of LCC.

Condition 2: Useful Knowledge

Information on flood risk in Leicester is available through different types of assessments performed in the city. On the national level, flood risk is mapped by the EA. They provide an open source mapping service where users are able to check the risk of their property by postal code (Environment Agency, 2017b). The risk of flooding is mapped by the LCC to provide an overview of sources of flooding and the type of risk that flooding proposes. This is described in the Strategic Flood Risk Assessment (LCC, 2012a), which is updated every 5 years. The document also incorporates uncertainties caused by climate change. The LCC website attempts to put together information on flooding for the general public (LCC, 2017). There are some limitations in the information availability of STW, who do not publicly share their information, but do need to cooperate in providing information requested by other flood risk management stakeholders.

Information accessibility is ensured by the open source nature of the information, as exemplified by the EA mapping service and the LCC flooding website. With regard to understanding the available information, the main concern expressed in the interviews, was an issue with maps. Several interviewees had experiences with the general public misunderstanding flood maps. The key difficulty is that flood zones represent different levels of risk through definitive lines on a map. In this way, people may misinterpret their own risk of being flooded. For example, a change of 1:1000 year of flooding may sound like a low chance. However, the same chance can be expressed in 0.1% of being flooded each year or 1:13 chance of experiencing a flood

in a person's life (of 80 years). The way these risks are framed and depicted on a map, largely determine the risk perception of non-expert citizens. The referred to flood risk assessments such as the Strategic Flood Risk Assessment are full of technical details, and thus not aimed at the general public as well. The Local Flood Risk Management Strategy (LCC, 2015b) does include information that is relevant for non-experts, explaining responsibilities of different stakeholders and elaborating on the different types of flood risk. The information available is fit-for-purpose and understandable for the involved policy practitioners, which were referred to in the interviews (L.GC:10). Emergency information available also focuses on resilience at the community and household level, e.g. what to do in the case of a flood. This type of information is directly aimed at the public, and therefore understandable (LCC, 2017).

The main division on information occurs between EA, responsible for flood risk management at a national level, and LCC, which managers flood risk on a local level and has a greater understanding of local constraints. This makes sharing of information imperative. However, due to the division of responsibilities in knowledge production, there is more space to co-produce information. Within the city council departments, information is shared. The main co-production is together with the planning department on the issue of building potential developments in areas with considerable flood risk. Additionally, co-production aims at integrating information on SuDS for developers, and including benefits for green infrastructure enhancement and biodiversity (LCC, 2012b p. 79-81, p. 79-84).

Condition 3: Continuous Learning

In terms of monitoring, there is a flood warning system developed by the EA, which combines gauges of river-levels of the main rivers with rainfall forecasts (Environment Agency, 2017a). At the local level, there is a register of reported historic incidents, which are reported in the Preliminary Flood Risk Assessment (LCC, 2011, p. 18-20). However, since the assessments are done every 6 years, it limits monitoring for current incidents. It is also not clear to what extent incidents lead to improvements or a change of strategy. One explanation could be the limited number of recent incidents.

In terms of evaluation, the EA produced a Strategic Environmental Assessment of the future Integrated Flood Risk Strategy of Leicester (Environment Agency, 2016) report which considers different societal and ecological effects for the river catchment level at Leicester. The type of baseline assessment, can be interpreted as being innovative through the use of cross-disciplinary effects, considering social and ecological implications. However, assessments are done ex ante. Improvement of local policy is subject to renewal of strategies, on predetermined delivery-periods. Criteria are mainly concerning whether improvements have been delivered, which constrains the evaluation towards more effective change, e.g. by reviewing ex post on local level.

Cross-stakeholder learning is occurring through partnerships that bring together different stakeholders. Examples of this are the LLFA board meetings, where there is interaction between different departments of LCC, and the TRT. The River Soar Catchment Partnership, which creates a platform for different stakeholders involved with the river. The Regional Flood and Coastal Committee, where different local authorities surrounding the river Trent, meet to exchange issues. These types of meetings, including different stakeholders are encouraging if they exceed an informative character. Some constraining issues might be that exchange for decision-makers is based on everyone focusing on their own agenda, which can constrain the learning between stakeholders. Moreover, the last two examples exceed the city-level and are more focused on managing regional aspects, or managing the river at the catchment level.

Condition 4: Stakeholder Engagement Process

For stakeholder involvement, there are clear consultation procedures. The consultation is mainly conducted when drafting new strategy reports. The last account on which this was done was for a strategy drafted in

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

2015 and in 2018 (L.GC:3). Feedback or comments can be provided by different stakeholders, in most accounts through an online platform. There are also statutory consultees: English Heritage and Natural England. In addition, the EA and STW provide feedback on consultations as well. Comments from the general public have only been minor amendments. Stakeholders can exit the engagement process at any given time (L.GC:3), which implies there are no procedures for exits.

Consultation periods are approximately two months. The level of interaction does constrain the inclusiveness of the stakeholders involved. There is an effort made to include stakeholders in the consultation process. Therefore, the process of consultation is dependent on the general public informing themselves on these types of issues. Apart from consultations, stakeholders can raise issues themselves in council or ward meetings. However, stakeholders need to be aware of these options.

Condition 5: Management Ambition

Uncertainty associated with climate change and flood risk are part of the core planning strategy (LCC, 2014), within climate adaptation plan and the Local Flood Risk Management Strategy of the LCC (LCC, 2015b). However, the emphasis on short-term projects constrains the formulation of clear pathways towards these long-term goals. Thus, policies are ambitious in terms of acknowledging that long-term action is needed, but restricting with regard to cohesion of short-term actions and long-term visions.

The integration of sustainable strategies does imply this strategy is embedded in the existing discourses. There is consensus on the need to adapt to climate change for flood risk. Partnerships are attempted to be built, also to provide a more secure basis for funding. There is a sense of environmental awareness embedded in Leicester, which is encouraging for integrating a long-term, sustainable policy.

In terms of integration of policy, administrative boundaries regarding river management are present. Mainly due to the boundaries of the city and surrounding boroughs, but also due to the approach of the EA, which does only to a certain extent consider upstream effects. Also, a national organisation such as EA, is dependent on local knowledge from the local council to manage their assets effectively. On the local level, fragmentation is there due to the division of responsibilities, involving many actors, which can pose constraints for bringing different policies together. Attempts have been made to enhance cooperation between different sectors, so to integrate the development of green space infrastructure with flood risk management. More constraining is bringing together the targets for housing development, which is set out for the LCC planning department by national standards (set out by the Department for Communities and Local Government). While at the same time alleviating properties from flood risk, which is a main aim for the EA. It implies that additional measures need to be taken, when building in flood risk areas. These diverging aims do constrain the integration of local management.

Condition 6: Agents of Change

Innovative approaches to minimise flood risk are limitedly available in Leicester. The main constraints are finding opportunities as an entrepreneur, and to create support for projects that have a higher risk, or might not have quantifiable outcomes.

Collaboration and building new relationships are listed in the Local Flood Risk Management Strategy (LCC, 2015b), mainly for as a means of funding flood risk projects. This is listed 'partnership funding' this is also with businesses such as developers. This is in line with the approach of the EA, who has more funding available for partnership funding. Ambitions are there, however trust relationships with unconventional partners have not yet been established for flood risk specifically.

Long-term and integrative strategies are formulated. There is an effort made to model future effects in a more integrative way, and to integrate this with a long-term vision. This can be found in the Integrated Flood

Risk Assessment, which examines this (Environment Agency, 2016). The Local Flood Risk Management Strategy (LCC, 2015b) is, in practice, less clear on how long-term visions are achieved by related intermittent targets. This constrains pushing the long-term vision forwards. The vision is this strategy, but the lack of how the vision can be put into practice limits the enabling of visionary agents.

Condition 7: Multi-level Network Potential

As mentioned in the previous section, there is willingness to form new partnerships to address flood risk. Moreover, there is also willingness to initiate new sources of funding. The freedom to develop alternative approaches is somewhat restricted by the rigid measures set out to report on flood risk. This leaves less freedom for the local authority to provide input. In terms of implementing strategies there is freedom to integrate flood risk to other sectors such as biodiversity and green space in the application of SuDS through planning practice, which has been done in Leicester.

The focus in Leicester is on defining roles and responsibilities, which is quite complex and includes many different stakeholders. This division is somewhat constricting the efficiency of dealing with the issue of flood risk. Due to the flexibility in tasks, responsibilities become blurred and the division is therefore less clear. The result is also, that the local authority needs to deal with issues ad-hoc even if it is not their responsibility, but due to their readiness of resources.

As referred to, a long-term, sustainable and integrated vision is present in Leicester, which is encouraging. The political awareness is present. An attempt is made to put these visions into practice. Constraints may be due to the lack of awareness with local communities on the issue, to create more support for action. However, due to many actors being involved, with diverging priorities, the authority to put forward a clear vision is to some extent constrained. This is evident due to the lack of securing long-term implementation.

Condition 8: Financial Viability

There are means to make property insurance more affordable for those in flood zones. This is a national scheme, called Flood RE (Flood RE, 2017). Additionally, the EA has alleviated flood risk in areas with more marginalised communities as a criterion for obtaining funding. The ambition is that, at the local level, schemes are developed to make flood protection and flood resilience measures more affordable for home owners. However, this is still work in progress, and not yet implemented (L.GC:5).

Due to the low level of awareness of the general public for flooding issues, public support for more sustainable or long-term approaches is constrained. Support for expenditure is there currently, but also subject to the general availability of resources of the local government which is subject to local as well as national political cycles, and thus the financial continuation (condition 8.3, Table 1) of flood risk issues.

Basic funding is secured through national provision through DEFRA and the EA, and through general funding for the local authority, while the EA investigates the implementation of long-term financial investment (Environment Agency, 2014). It is constraining that funding is only secured for the short-term, which is displayed in the Local Flood Risk Management Strategy. Financial constraints appear to be relevant for other indicators as well. Due to these constraints, there is a need to prioritise tasks.

Condition 9: Implementing Capacity

The use of policy instruments is not used to enhance desired behaviour. In this sense, the balance between housing development and flood risk alleviation is a challenge. Policy instruments could be used to; 1) pay for adaptation measures for housing development in flood prone areas or 2) to create more incentives for developers to integrate measures or their effort to create more innovative SuDS.

With compliance of legislations and agreements, there is some flexibility. For the implementation of SuDS, the existing flexibility in terms of planning application control does not lead to more sustainable actions. The

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

implementation of SuDS is not obligatory and if developers fail to do this, there are no consequences. The assumption is that this sense of flexibility in this case constrains effective change.

The emergency preparedness for floods in Leicester is very encouraging. The communication between emergency services and LCC is through the Emergency Planning department. They are also responsible for organising rehearsals as well as drafting and reviewing emergency plans. There is a large focus on preparedness and resilience of sudden events aimed at the household and community level. In terms of preparedness towards more gradual changes, more actions have to be taken to make the city more prepared in terms of mitigating the effects of climate change by implementing a longer-term strategy.

Concluding remarks on the governance capacity of Leicester

In Leicester, information availability on flood risk is broad. The information considers different aspects of flood risk, and anticipates future impacts by modelling future effects of climate change. There are numerous local flood risk reports that focus on technical aspects of flood risk, e.g. locating flood prone areas and modelling risks. Additionally, flood risk is considered in local strategies and action plans. This reflects in the scoring, the 'knowing' dimension scores by far the highest, compared to the other dimensions. However, improvements can be made to address the issue of flood risk in a more cohesive manner.

Although the availability of useful knowledge is ample, there is an underestimation of the actual flood risk by local communities. The general public does not change their behaviour as a result of being exposed to a considerable risk of flooding. Information provision for the public is mainly aimed at the resilience in the case of an actual event. There is a general focus on resilience and emergency planning, and the coordination between emergency services is present.

Despite incorporating flood risk in various local strategies, there are some constraints to effectively address the issue. On the management side, many actors are involved. Their roles and responsibilities diverge between different types of flooding, and also for different watercourses. Due to this, there is an emphasis on defining roles and responsibilities. However, there is a certain degree of flexibility in these roles, especially in the case of LCC and the EA. The EA is dependent on the local council for more localised knowledge. In some cases, this may imply more tasks to be executed by the local authority.

Balancing flood risk with spatial planning is one of the major challenges for the city. Pressures from the central government to provide housing needs to be addressed whilst ensuring that properties are protected from flood risk. Issues of flood risk and SuDS are part of everyday practices within the LCC, also due to their integration with spatial planning applications for new developments, and involving the drainage of roads.

An attempt has been made in integrating different strategies of green space and biodiversity with flood risk adaptation, which is an opportunity for expressing of a vision towards more sustainable practice. However, evaluative lessons from this are missing. Despite this, there is a relatively limited number of agents that are enabling change, and pushing towards more sustainable solutions and practices. Some partnerships are there, but their effect on decision-making can be limited.

Financial resources are available in Leicester, due to the acknowledgement of the raised risk in the city, compared to other areas. However, resources are not abundant and do not enable long-term integration. There is an urgent need to prioritise tasks, which poses constraints for long-term implementation.

3.2   Leicester's experiences with collaborative learning

In the following section, specific aspects of collaborative learning are examined with regards to SuDS in Leicester.

Flood risk management and surface drainage in the UK are highly decentralised and fragmented with multiple stakeholders responsible for various parts of the policy. This puts collaboration and learning at the centre

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

stage of effective flood management. Sustainable Drainage Systems (SuDS) is a policy innovation for managing surface water for flood control and water and environmental quality reasons. SuDS can be considered a subset of the approach of 'Natural Flood Management' (NFM), an approach that gained in currency since the Pitt Review (2008). Its major emphasis is on integration of urban drainage design and management with land use planning and other areas such as urban biodiversity management, water quality provision and urban planning more generally. The Leicester City Council SuDS Guide described SuDS as follows: "A SuDS mimics natural drainage, having some storage capacity, slowing the movement of water and achieving a reduction in volume leaving the site during a storm. The key difference between this and conventional piped drainage is that there is no one standard technique to be used universally. SuDS may take more time in the initial design but if thought through at the outset then there can be savings both in construction and longer-term maintenance. The term SuDS is a general term; made up of the use of a variety of techniques – either independently or as a collection of differing and complementary measures" (LCC, 2015c, p. 4). In addition to better flood control, the major benefit of SuDS is co-benefits for biodiversity, water quality, human health and well-being more generally, as well as aesthetics of urban living. In the following sections, the findings are presented on learning products, followed by an extensive discussion of learning processes that have led to such products, and contextual factors that may explain the process and products of collaborative learning in Leicester, such as the structural, social and technological factors.

Learning Products

Learning products involve cognitive changes and changes in collective behaviours. Remarkably, all actors including LCC's various teams, the Severn Trent Water, policy consultants, and the Environment Agency, reported a change in the attitude towards SuDS from an unrealistically expensive and unreliable drainage strategy to a serious alternative to conventional drainage. A number of interviewees mentioned that SuDS are an innovation on the brink of being widely adopted in Leicester and the UK.

SuDS are also increasingly supported at the political level by the deputy-mayor of Leicester, who noted that "*we're also looking at these what we call multiple benefits, where we can get some biodiversity on the back of it*" (L.CL:1). Collaboration between various actors involved in flood protection has been mandated by The Water and Flood Management Act adopted in 2010 that required a partnership approach between national and local stakeholders, such as private water companies and citizens (UK Government, 2010). The law also made SuDS obligatory for new developments larger than ten properties and advised local authorities to promote SuDS through the system of approval of planning applications. The law, however, came short in terms of instituting SuDS approval bodies as advocated by the Pitt Review (2008).

The Local Lead Flood Authorities (LLFA), in bigger cities these are city councils, became a statutory consultee on surface water management in the planning process. LCC thus is responsible for promotion of SuDS locally by suggesting SuDS to property development, but the national level legal or policy framework that supports this work is lacking. Interviewees mentioned that LCC lacks sufficient power and resources to ensure that SuDS are implemented through monitoring and enforcement of SuDS promised by the developers (L.CL:6; L.CL:7). Furthermore, LCC is not obliged to adopt SuDS in terms of taking ownership and long-term maintenance of them unlike roads and highways. There is also uncertainty with regard to the long-term performance of SuDS compounded by the absence of a framework for maintenance of SuDS to ensure their performance. This institutional vacuum makes collaborative learning central in any efforts to build support for and implement SuDS practices. As a result of such learning, a gradual acceptance of SuDS could be observed in Leicester as captured by an urban planner working for LCC as follows (L.CL:2): "*Firstly, it (SuDS) has gone from being a nice idea to being a procedure, it's gone from 'we would like you to do something like this if you're an innovative developer', to 'we have a policy and you will comply with it' and then going from that to, 'how best will you comply with it?'*"

This change in attitudes and beliefs of LCC officials and partner organisations has gradually translated into some behavioural changes, such as the publication of the Leicester City Council's "SuDS Guidelines" (LCC, 2015c) and the "Leicester Green Infrastructure Strategy 2015-2025" (LCC, 2015d). The strategy has over 150 pages of text with policy recommendations to various bodies in Leicester to implement better green areas

management, including a section on SuDS (LCC, 2015d, p. 80). Green Infrastructure can be defined as "the networks of multifunctional green space which sit within, and contribute to, the type of high quality natural and built environment required to deliver sustainable communities" (LCC, 2015d, p. 15). Such green infrastructure is maintained through the creation of new river corridors, waterways, woodlands, nature reserves, urban green space and historical sites (LCC, 2015d).

The LCC SuDS Guide, in turn, is much shorter – about 22 pages and has a function of awareness raising about the goals of SuDS, the various types of SuDS and some "best practices" involved. The Leicester SuDS Guidance document plays an important role as a "go-to" place for examples of SuDS written in simple and accessible language (coined 'plain English') for developers. There are also internal LCC SuDS guidelines and a set of best practices maintained by one of the SuDS champions. Council employees, thus, believe that change is taking place, but see it as slow and gradual, consisting of many small-scale changes: "*I'm also a very strong believer in small scale cumulative change so we get a scheme like Asda which was a brilliant scheme but it hasn't changed the attitudes and it's only one particular area but if everybody does a little bit and easy wins, you know, don't kill yourself trying to get something that's never going to change […] So building on small wins is important*" (L.CL:3). Asda is a chain of supermarkets in the UK, the particular site in Leicester is equipped with SuDS (LCC, 2015a).

Apart from changes in attitudes and behaviour towards applying SuDS in daily work of the council, the most important area of learning occurred in exploring the new ways of building support for SuDS within the council. Two SuDS champions at LCC worked side to side to build greater acceptance for SuDS by various communication and persuasion strategies, an example of learning that both emerged from collaboration and supported further collaboration (Heikkila and Gerlak, 2013). Their strategy to build support for SuDS at LCC included such actions: 1) emphasise multiple benefits of SuDS that go beyond flood risk management, including green space in urban areas, mental health and urban biodiversity; 2) provide visual maps and artistic impressions in planning documents to make SuDS less abstract and more tangible, and show that it is realistic to implement; 3) provide quantifiable benefits where possible in terms of estimates of houses lifted from the flood risk zones and other benefits from SuDS; 4) provide specifics in how SuDS can be built and operated using examples from other areas; and 5) experiment with new development in the city with support from innovative private and public sector actors, such as the Asda supermarket or the Ellis Meadows water retention area (L.CL:3; L.CL:4; L.CL:6; L.CL:8).

Learning Processes

Learning processes include the process of acquiring, translating and disseminating information. The major source of knowledge on SuDS within LCC is from the Construction Industry Research and Information Association (CIRIA), which has its own SuDS guidance and was a source of inspiration for the SuDS champions at LCC (CIRIA, 2018). These two champions managed an active network of professionals that regularly met to discuss sustainable drainage and travelled to visit various sites to learn from SuDS elsewhere. This contributed to both substantive learning about implementation of SuDS practices, and building support for this approach at the council. One SuDS champion reported: "*I was aware of the Pitt Review and I was aware of the changes that could be coming, so I started to make contacts here with the Head of Highways and things like that and said that this is what I wanted to do, I wanted to set up this learning group for planners so that when the Flood & Water Management Act came in, we would all be prepared and we would all have backup because when you work in a planning department, what developers like to do is to present you with a unique case, they make it difficult so you can't say 'this is what we can apply' and SuDs of course is a bespoke solution to every problem*" (L.CL:3).

Thus, under conditions when SuDS is not mandatory but commands normative legitimacy, there is room for manoeuvring; social capital, ties, trust, shared vocabulary and leadership become key to keeping the innovation visible and on track. Such work requires skills in crossing boundaries and connecting various actors, and building support for SuDS in places where reluctance and distrust persist. One boundary spanner at LCC described this type of work as follows: "*if a developer is thinking, 'I've got housing here, I've got a road here, I've got an open space there, if I let the highway water drain across onto the open space, what would be the issues?' Well traditionally…Severn Trent would say they wouldn't accept the water into their pipes*

because that's land drainage. Now we've got through by going to Severn Trent and talking it through and getting them to see the scale of it" (L.CL:3).

Institutional Structure

This section discusses the institutional structure in Leicester. Collaborative contexts can differ extensively based on who participates in the collective setting, what roles different actors play, and how those roles are structured. Therefore, in this section the roles and responsibilities of different actors in Leicester are examined (Heikkila & Gerlak, 2013).

The United Kingdom's flood risk policy has undergone major shifts in the past two decades, which has also seen frequent major flood events and an average annual damage of GBP (£) 250 million (Penning-Rowsell & Pardoe, 2014). Among the most notable changes is the greater emphasis in policy documents on "softer" measures of flood prevention, a part of which is SuDS (Defra 2004; 2005), and on decentralisation in dealing with surface water flooding (ibid). Since 2010, local authorities, such as city ('unitary') councils, county councils, district councils and parish councils, have acquired statutory role in surface flood risk management (Penning-Rowsell and Pardoe, 2014). Critics have argued, however, that with the transfer of responsibility, the transfer of resources has not taken place (Begg et al., 2015).

The United Kingdom's surface flood risk management is highly decentralised and fragmented, where collaboration is necessary "to find workable ways to take multiple frames into account and build bridges between them" (Dieperink et al., 2013: 24; Alexander et al., 2016). However, such fragmentation, and in the case of SuDS, the lack of an overarching authority and legislative support are barriers to collaborative learning (L.CL:15; Dolowitz et al., 2018). This complexity also has put an additional burden on local authorities to coordinate and manage flood risk management operations hitherto coordinated at the national level. The lack of technical and financial capacity of LCC to deal with its surface flood risk management tasks properly has been noted by scholars of other Local Authorities in the UK as a consequence of decentralisation with little transfer of resources (Begg et al., 2015). In the case of Leicester, the lack of capacity translates in the inability to control whether proposed SuDS features of property development are actually implemented (L.CL:6).

Linked to the issue of capacity, is the room for more active engagement with citizens and citizen groups with regard to the risks of flooding, the importance to get insured and to implement property level flood protection measures. LCC engages with population through school projects, the Flood Wardens scheme and local festivals. A contributing factor to limited public engagement is the lack of serious flooding incidents in Leicester of the past 50 years and therefore, the lack of public and political interest in the issue (L.CL:6).

That notwithstanding, there are multiple areas to facilitate collaborative learning that encourage exchanges of knowledge and experiences among organisations involved in flood risk management. One such forum is the Regional Floods and Coastal Committee (RFCC) (L.CL:1; Benson et al., 2016). The RFCCs were introduced in 2011, and their mandate encompassed a collaborative process at the basin level in order to distribute financial contributions of various local authorities in a coordinated and participatory fashion (Benson et al., 2016).

In addition, the currently ongoing Integrated Flood Risk Management Strategy presents an opportunity for deliberation and joint planning involving LCC, Severn Trent Water, and the Environment Agency for some localised case of flooding. These efforts help to gradually overcome disciplinary boundaries between highway engineers, landscape architects and biodiversity officers in LCC (L.CL:5). The entrenched culture of conventional drainage engineering to deal with the surface water at the LCC however is one of the major structural barriers to SuDS, a finding that is corroborated also by other scholars of flooding in England (Dolowitz et al., 2018).

Social Dynamics

The social domain includes such factors as trust between actors, tolerance for differences in opinion and openness of communication, levels of conflicts and the ability to resolve such conflicts, and the role of leadership in dealing with SuDS. One strong conclusion from the interviews is that all actors felt that there is a good inter-personal basis for dialogue and collaboration. One interviewee (L.CL:12) mentioned the importance of maintaining personal relationships between representatives of various organisations involved, the message was also echoed by a policy consultant (L.CL:16). Overall, the transience of people is seen as a major challenge to building trust and maintaining sharing at high levels (L.CL:16).

One of the measures of a socially cohesive collaborative system is the emergence of a shared vocabulary among actors from various departments and agencies. Serious disciplinary boundaries remain between SuDS advocates/practitioners and conventional drainage engineers that are also manifested in professional vocabularies and ways of thinking about drainage. The following quote from an LCC planner is rather telling: "*I get many planning applications (that) go across my desk with ponds where the engineer has written "swale" on the pond and that's worrying because it's not a swale and it's missing the whole point of what a swale does and that's from somebody who calls themselves a drainage engineer, so I'm a little worried that we're not, that's why I say about this, we're at the edge, we're still pushing*" (L.CL:3).

Overall, the social capital between individuals from various involved policy actors and ties between them, the channels of communication and the culture of openness for criticism is present in the case study and actively maintained by both SuDS champions at the LCC and other actors.

Technology and Functionality

The framework on collaborative learning also includes the "technological and functional domain" that depicts the capacity of the organisations to deal with the information in terms of technical and transparency features. Geographic information systems (GIS), and mapping and sharing databases between various departments within the LCC and between LCC and STW are common and have been mandated by the Flood and Water Management Act 2010 (UK Government, 2010). Internal communication is based on a number of databases not accessible to the researcher.

LCC has limited capacity to process planning applications, and, monitor and enforce implementation of SuDS schemes. As the SuDs approval bodies' proposal has not been implemented despite the call for it in the Pitt Review (2008), the SuDS policy de-facto is not monitored. At the same time, Local Authorities are confronted with constrains inpersonnel, time and funding as has been reported by various authors (Benson et al., 2016). While there seems to be much information on both background of flooding issues and possible solutions, the problem does not lie in the amount or appropriateness of information but in the capacity of actors to process it.

Overall, there is sufficient level of technological and information provision at LCC and other stakeholders involved, but the bottleneck lies in the human capacity to process this professional information and act upon it, especially with regard to SuDS schemes. The lack of resources inhibits LCC from monitoring and enforcing SuDS implementation, as well as from engaging with citizens more actively to assist in putting SuDS in place, or raising awareness about flooding and SuDS in schools or communities (L.CL:6, L.CL:8). There is also the lack of transparency in decision-making by LCC on when SuDS are required or not, in both new developments by private parties and LCC itself as decisions are not readily accessible to public.

Concluding remarks on collaborative learning in Leicester

At the moment there is no challenge to conventional drainage in Leicester as SuDS remains more at the margin of practice with the exception of a number of large projects, such as the Asda supermarket, Ellis Meadows, The Greyfriars initiative (L.CL:8). This is in contrast with the overall acceptance of SuDS as a desirable policy solution by all interviewed actors. This dissonance between the normative appeal of SuDS and the lack of its implementation presents an empirical puzzle.

Furthermore, the institutional structure in flood risk management in Leicester is very fragmented and no formal channels or procedures exist to support SuDS apart from the two recent documents pushed through by the SuDS champions – the "LCC SuDS Guidelines" (LCC, 2015c) and the "LCC Green Infrastructure Strategy" (LCC, 2015d). In the absence of institutional rules and procedures for SuDS adoption or enforcement, the social dynamics, inter-personal trust, open communication, and personal leadership became very important for collaborative learning. The technological and functional factors proved less relevant in our research as the bottleneck in managing information lies in shortages of personnel, resources and power at LCC and not in the lack of technological abilities or data.

The major finding of this study is that active collaborative learning may result in cognitive and behavioural changes of actors without causing implementation of the innovation on the ground. Among three contextual domains, social dynamics domain proved most prominent. Structural factors, such as actors in positions of power, can facilitate social dynamics by establishing a professional dialogue (Heikkila and Gerlak, 2013: Dengler, 2007). In the absence of structural support for SuDS in Leicester, leadership of LCC champions became front-stage. By spanning boundaries between LCC, Severn Trent Water, and the Environment Agency, two SuDS champions created inter-relationships that involve trust and patterns of openness to new ideas (Lipshitz et al., 2002). They encouraged a dialogue between drainage engineers and SuDS proponents that is a crucial factor for learning (Ohlsson, 2011). SuDS champions together with other actors work on creating joint professional norms and language that would help bridge the disciplinary divides between various communities at LCC (Heikkila and Gerlak, 2013). To sum up, the social dynamics factors, and especially the role of leadership, were the major drivers of learning around SuDS in Leicester.

The fact that collaborative learning failed to provoke a broader policy change in Leicester seems to be representative for England as a whole. For example, Dolowitz et al. (2018, p. 85) claimed that "(most) Local Authorities now recommend SuDS through the development planning process, but enforcement is constrained by the lack of implementation of national policy relating to SuDS and new developments" (Dolowitz et al., 2018, p. 85). This learning-implementation gap may be explained by the institutional and legal vacuum at the national level, the government inertia towards policy innovations, and uncertainty about the costs attached to adopting and maintaining SuDS.

The Leicester case study presented two further challenges for SuDS implementation: disciplinary boundaries and the "agency culture" of the UK public administration system. Disciplinary and organisational boundaries between drainage engineers and SuDS proponents prevent joint learning. As long as these two communities continue holding on to different identities, and without a push from above, learning between them will be limited (Dawes et al., 2009, p. 397). Shifting from conventional drainage to SuDS may present a threat to drainage engineers due to the loss of exclusive control over this area and further inhibit an open dialogue and collaboration (Dawes et al., 2009; Argyris and Schon, 1996). A second challenge is what Benson et al. (2016: 333) referred to as "agency culture", or the complex bureaucratic system that discourages public participation and inclusive governance. The "collective decision-making process that is formal, consensus-oriented and deliberative" is largely absent in flood risk management at the local level, a statement supported also by earlier research (Ansell and Gash, 2008: 544; Benson et al., 2016; Dolowitz, 2018).

There is a partial impact of collaborative learning on the emergence and implementation of SuDS in terms of active cognitive learning and the adoption of SuDS in formal LCC planning documents for urban drainage. However, the progress with implementation of SuDS in practice is tenacious due to major barriers such as reluctance of drainage engineers, uncertainties related to costs of adoption and maintenance of SuDS and, most importantly, the lack of an institutional framework on SuDS implementation.

Social dynamics factors are most important in fostering collaborative learning, two key advocates of SuDS managed to achieve insertion of SuDS in the LCC strategic documents and an ongoing change in professional norms. However, without a strong institutional support from the national government, such bottom-up efforts remain limited. More support from the national government is needed to implement SuDS, for example, through a legal framework for mandatory SuDS for new development and mandatory retrofitting of existing properties, or economic incentives for real estate developers to adopt SuDS voluntarily. The

national government may also support SuDS indirectly through social marketing campaigns and keeping SuDS "ranking lists".

3.3   Potential role of the POWER DSP in Leicester to address flood risk

Based on the governance capacity analysis and the in-depth analysis of collaborative learning provided in the previous sections, here the potential role of the Digital Social Platforms (DSP) (which in the case of Leicester, is the Leicester Water Community) to strengthen the governance capacity dimensions is discussed. We focus on the DSPs potential to strengthen the first four conditions of the governance capacity framework – awareness, useful knowledge, continuous learning, strengthen stakeholder engagement process – as the DSP has the most potential to influence these conditions. The five remaining conditions of the framework are discussed together. In the end of this section recommendations are provided on how the DSP can be improved in Leicester. In Box 1 below an overview is provided of the key characteristics of Leicester's DSP. These characteristics are retrieved from other deliverables of the POWER project, including D3.4 (report on the gamification model used within POWER DSPs) and D3.5 (report on the POWER engagement model).

Box 1: Key characteristics of Leicester's DSP

The DSP of Leicester revolves around the theme flood risk. The water community of Leicester has the following key objectives: (1) increase knowledge of different types of flooding that can take place in Leicester; (2) enable target groups to understand their flood risk and monitor their risk through a visual exploration of flood risk information; (3) raise awareness and preparedness on flood risk to encourage participations to take action within the platform such as developing a flood plan, and (4) co-creation and co-design of topical contributions from young users on flood risk awareness and preparedness. To increase knowledge and raise awareness and preparedness on flood risk, users can find information about the water challenge on Leicester's DSP. On the one hand, information is provided to increase knowledge about floods that have occurred in the past and what the city of Leicester is doing to help prevent flooding. On the other hand, users are made aware of their individual flood risk. They are asked if they know their flood risk, and interactive visualizations are provided which give live information and flood warnings. Furthermore, the information on the DSP aims to make users more flood prepared by giving a step-by-step preparation checklist which residents can use to become flood prepared. In addition to the residents, the city of Leicester explains what they are doing to help prevent flooding which includes for instance sustainable urban drainage systems.

After browsing the information that is provided on the DSP, users can leave a comment and discuss with each other about flood risk. Users can like other comments or share the comments on Facebook, Twitter or by e-mail. However, to share know-how and give feedback on the platform it is required to make a personal account. This is the case for all POWER DSPs. If there is no imminent threat of flood risk it is difficult to incentivise people to visit the DSP. As a consequence, people need additional incentives and strong persuasion to engage in learning about and performing flood risk preparation actions. Therefore, gamification techniques are used in the platform to provide additional motivation drivers and incentives to help increase user interaction with the DSPs attempting to raise awareness on flood risk in Leicester. An important element of the gamification model is the point mechanism that uses points to reflect the extent to which a given action contributes to increasing preparedness on a given dimension. When a user is registered to the platform they can see how much progress is made on different dimensions related to flood risk, including problem awareness, know-how and readiness to act. The progress is reflected in the number of points one received, for instance by leaving a comment or reading an information page. The gamified incentives motivate various types of users, supports multiple perspectives and allows to reach common goals. In addition to this, users can join the idea contest. The contest is an innovative participatory method that helps cities engage their citizens with sustainability topics and develop innovative ideas. Through a co-creative approach, innovative ideas are developed to better address flood risk in Leicester. Besides online participation, there are also design workshops organised which enable any citizen to effectively create ideas in a short session.

Potential of the DSP to raise awareness

In this study it became clear that the effect and impact of flooding is underestimated by local communities. According to one interviewee (L.GC:5) this is, among others, related to the absence of a framework that aims to create more awareness with the public, limited personnel for awareness campaigns and language barriers. The DSP can be used as a tool to raise the awareness of local communities on the negative impacts of flooding, and at the same time does not require high investments in terms of for instance time for LCC staff. The DSP provides information on previous flood events in Leicester and gives tips on how to prepare for flooding. The information provided on the DSP can also be shared on social media pages to increase the number of people reached in the community.

If the local community in Leicester is more aware of flood risk, it could enable action or change. It could for example increase the number of flood wardens who alarm their communities and have the ability to create community flood plans. This functionality is also discerned by the DSP as it enables the council to make additional pages to for instance actively recruit flood wardens. To alleviate current language barriers, the DSP has the functionality to add multiple languages. In the future, more languages could be included to reach more stakeholder groups in Leicester (currently only the English language is available).

As mentioned in Section 2.2, Mukhtarov et al. (2018) describe four types of interaction between citizens and a government in the context of ICT-facilitated public service provision. The DSP includes all these different types of interaction. The first type is citizen sourcing, when the "public helps government to be more responsive and effective" (Linders, 2012, p. 447). Soliciting comments or ideas on policy and legal proposals, is a type of citizen sourcing. This can be done online (Mukhtarov et al., 2018) when soliciting comments and ideas of citizens online regarding a particular policy or legal proposals. One of the potentials of the DSP is to gather opinions from stakeholders regarding particular water policies, therefore it covers the first type 'citizen sourcing'. The second type is government as a platform. Here the government can help citizens in improving productivity or achieve goals, such as flood risk preparedness. The DSP can be used by the government as a way to educate citizens on a wide variety of subjects such as how to prepare for floods. Such a way of communication is relatively conventional and lacks feedback of citizens to the governmental agencies. Moreover, in order to educating citizens, governments may use DSPs to make their activities transparent and promote legitimacy and trust. For instance, in Leicester the DSP can be used to transparently communicate how decisions are made within the council and which criteria are used for deciding whether SuDS is required or not. The third type of interaction is 'do it yourself government', where information is exchanged among citizens and community initiatives. The DSP can provide new avenues for political activism, encourage citizens to share peer-to-peer flood information and thereby build social movements and coalitions that can lobby for a particular water issue (Mukhtarov et al., 2018). In addition to raising awareness on flood risk, the DSP can also be used to raise awareness on SuDS. The fourth type is government-citizen co-production. The DSP could be used as way to support groups of people engaged in a common task and provide an interface to a shared environment. Virtual learning platforms can enhance the building of trust and a common vision amongst citizens, the governments and various other stakeholders (Mukhtarov et al., 2018).

Potential of the DSP to increase useful knowledge

As described in previous sections, information on flood risk is widely available and accessible on the website of the Leicester City Council (LCC). There were, however, experiences with the general public misunderstanding flood maps. This is an important issue as maps are the main sources available. To minimise misunderstandings, explanations on how to read the maps could be provided on the DSP. Furthermore, in this study it was found that there is a lack of transparency in decision-making by the city council on when SuDS are required since decisions made by the council on SuDS implementation are not readily accessible to the public. This transparency can be improved with the use of the DSP as it can be a tool for local businesses or citizens to come in direct contact with the LCC. The DSP of Leicester presents information on SuDS in the city. This includes examples of SuDS applications and a video which shows a partnership SuDS scheme that

has been completed in Leicester. To increase knowledge of SuDS among stakeholders, the LCC could add more information on how decisions are made within the council and which criteria are used for deciding whether SuDS is required or not.

DSPs help to improve effectiveness and efficiency in urban water governance while enhancing opportunities for citizens to co-produce knowledge and services together with government agencies (Mukhtarov et al., 2018). However, DSPs provide relatively little opportunities for citizens to exercise authority and co-produce knowledge together with government agencies. At present the government remains largely in control of decision-making, policy design and policy implementation (Mukhtarov et al., 2018). In addition to educating citizens, governments can use DSPs to be more transparent and share information which in turn can enhance more trust (Mukhtarov et al., 2018).

Potential of the DSP to enable continuous learning

Continuous learning was found to be encouraging in this study. Cross-stakeholder learning is occurring through partnerships that bring together different stakeholders, which could be further improved if decision-makers not only focus on their own agenda. The DSP can be used to build trust and a common vision among citizens, governments and various other actors.

Potential of the DSP to strengthen stakeholder engagement

For stakeholder involvement there are clear consultation procedures in Leicester, and the consultation is mainly done when drafting new strategy reports. At this moment, LCC already uses another online platform to gather feedback or comments from different stakeholders. This is a form of online citizen sourcing, collecting comments and ideas of citizens regarding particular policy or legal proposals referred to this type of interaction as "direct digital democracy". This type of interaction allows citizens to provide opinions and comments to the government (Mukhtarov et al., 2018). In this study it was found that a contributing factor to meagre efforts of public engagement on flood risk is the lack of serious flooding in the area in the past 50 years and therefore the lack of public and political interest in the issue.

Furthermore, it was found in this study that there is a limited nature of engagement. Making use of the DSP could lead to lowering transaction costs as it is for instance not necessary to have personnel on the streets to distribute leaflets. Instead, the information can be provided and distributed through the DSP.

Potential of the DSP to strengthen additional conditions

Although the DSP mainly addresses the prior mentioned conditions, it can also strengthen additional conditions of the GCF. In this study it was identified that innovative approaches to flood risk are limited in Leicester. The DSP supported innovation in the form of an idea contest. Stakeholders were encouraged to submit their ideas for solutions to sustainability challenges that Leicester faces, including flood risk. This led to more innovative approaches to flood risk, but also encouraged stakeholders to engage with the community and share peer-to-peer information and knowledge on flooding. Furthermore, the DSP can be used by the government as a tool to create a long-term vision or conCensus that includes all stakeholder opinions. Currently, many actors are involved with diverging priorities which requires authority to put forward a clear vision. The DSP can thus strengthen this by building a common vision among citizens, the city council and various other actors. Hence, the DSP can empower agents of change (condition 6; Table 1), further strengthen the local network (condition 7) and improved engagement and innovation may lead to a higher implementing capacity (condition 9).

Box 2: Recommendations to ensure optimal use of Leicester's DSP

The DSP has high potential to raise awareness and increase knowledge on flood risk in Leicester. To ensure the optimal use of the platform we recommend the following:

1. The City Council is recommended to use the DSP as a medium to make their activities regarding Sustainable Drainage Systems more transparent to citizens by disclosing information (e.g. information on when SuDS are required) which could promote more trust and legitimacy. In addition, flood wardens can be more actively recruited through the DSP. It is therefore recommended to develop a new information page solely on this topic;

2. To minimise misunderstanding amongst stakeholders about the flood maps, a better explanation on how to read and interpret the maps is recommended;

3. Users of the DSP can earn points by getting informed and engaging with water challenges in Leicester, however no reward stems from collecting those points. More non-digital positive reinforcement could be fostered by giving tangible rewards when a certain number of points are collected by users as a way to increase the number of visitors on the website.

4   Water governance, learning and the potential role of a DSP in Milton Keynes

This chapter presents the results of the governance analysis of Milton Keynes. First of all, the capacity to govern drinking water consumption in Milton Keynes is analysed using the Governance Capacity Framework. Building on this baseline, an in-depth case study analysis of the pre-conditions for collaborative learning follows. Finally, the potential role of the POWER DSP to address drinking water conservation is examined.

4.1   Milton Keynes governance capacity to reduce drinking water consumption

In this section the capacity to govern the challenge of water pollution by the use of plastic water bottles is analysed based on the governance capacity framework (Table 1).

Since water companies have been privatised in the UK, citizens face a choice between consuming water distributed by their assigned regional water company, or by the variety of bottled water companies selling their bottles in stores. Initially, bottled water was consumed as a luxury product from the late nineteenth century onwards, with a steady growth in sales observed in the mid-1970s, and a shift to plastic in the 1990s (Hawkins, 2009). In the UK, 13 billion plastic bottles are used every year, of which 7.7 billion are water bottles (Environmental Audit Committee, 2017). Estimates of the yearly litres of bottled water consumed in 2016 ranged from 35.9 to 56 per capita (EFBW, 2016; Zenith Global, 2017).

Refill is a campaign initiated by the Non-Governmental Organisation (NGO) City to Sea that aims to reduce the consumption of single-use water bottles. The objective of Refill is to promote free tap water and bottle refills available anywhere with a safe tap across the UK, including cafes, shops, public buildings and businesses. Behaviour change is encouraged by making it more convenient for people to refill their bottles while away from home, thus reducing bottled water purchases. People can download a Refill App which shows where participating businesses are located and stickers on front-windows also help locating these premises. In the past three years, Refill initiatives have been launched via partnerships between local actors in several cities, and in January 2018, all water companies across the UK agreed to launch a partnership with City to Sea to roll out the scheme in a greater number of municipalities.

Milton Keynes is one of the municipalities considering initiating a Refill scheme. Since Milton Keynes has not yet implemented the scheme, three established Refill initiatives (Norwich, Colchester and Oxford) were studied as well in order to draw knowledge that might be useful for the successful implementation of Refill in Milton Keynes (see Figure 5). Norwich and Colchester lie in the region served by Anglian Water, the company supplying drinking water to Milton Keynes, whereas Oxford is supplied by Thames Water. These three cities are included in the analysis because Refill in Milton Keynes is still at a very early stage.
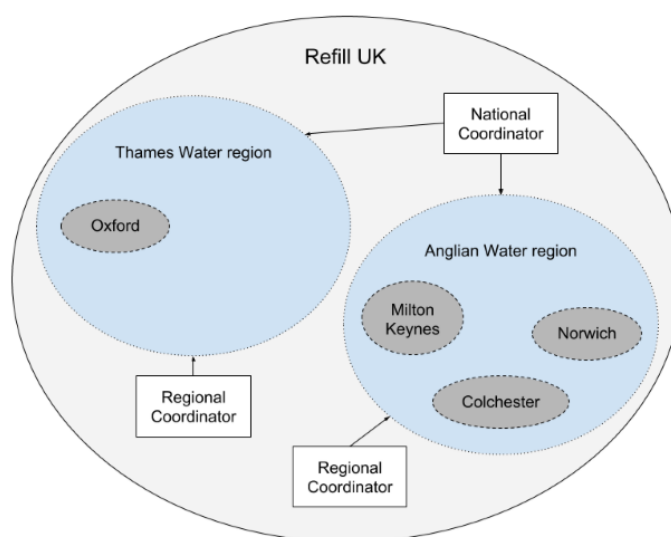
Figure 5 Visual representation of the schemes studied within Refill UK

Key stakeholders involved in plastic pollution

In Milton Keynes, various stakeholders are involved in reducing pollution by plastic water bottles. Each stakeholder has a different role and responsibility. These stakeholders are discussed briefly below.

On January 2018, the European Commission adopted the first plastics strategy, which will "transform the way plastic products are designed, used, produced and recycled in the EU" (European Commission, 2018a). The commission also proposed new rules to target the single-use plastics, including collection targets: "Member States will be obliged to collect 90% of the single-use plastic drinks bottles by 2025, for example through deposit refund schemes" (European Commission, 2018b). However, at present it does not include minimising the use of plastic water bottles.

At the national level, the UK government is an important stakeholder. Especially, DEFRA plays a major role in reducing plastic pollution. Recently, DEFRA launched the 25 Year Plan to Improve the Environment, setting out the government's goals for preserving and improving the environment. Notable targets include eliminating all avoidable waste by 2050 and all avoidable plastic waste by the end of 2042 (DEFRA, 2018). DEFRA works closely together with the Waste and Resources Action Programme (WRAP). In 2000, this charity was set up to promote sustainable waste management. WRAP also initiated the UK Plastics Pact, which is a collaboration that brings businesses from across the plastics value chain together. One of its main objectives is that by 2025 actions are taken to "eliminate problematic or unnecessary single-use packaging items through redesign, innovation or alternative (reuse) delivery models" (WRAP, n.d.).

As mentioned previously, this research focuses on the Refill project which was initiated by City to Sea. In Spring 2015, this NGO was founded to reduce the amount of litter flowing from the Avon into the Bristol Channel during Bristol's year as European Green Capital. At present it is campaigning to prevent plastic pollution at source, therefore they began Refill in 2015. City to Sea is funded by a mixture of sponsorship, grant funding and selling stainless steel bottles. Partners and supporters include amongst others water companies such as Thames Water and Anglian Water (City to Sea, n.d.). Anglian Water supplies water and water recycling services to more than six million customers in the East of England, including Milton Keynes. The water company wants to "lead the way in raising awareness about how essential water is to life, to people and the environment, and to a vibrant and growing economy" (Anglian Water, 2018).

At the local level, the Milton Keynes Council (MKC) is the unitary local authority of the Borough of Milton Keynes. The council provides many services, including waste collection and recycling (MKC, n.d.). Other stakeholders at the local level include residents of Milton Keynes, local businesses and grassroot community initiatives. The Council has a track record in sustainability and smart city initiatives (Caprotti & Cowley, 2016). However, it is important to note that the Refill campaign cannot be run by the local authority. Local citizens are the target group of Refill, whereas local businesses should participate in the project in order to function as a Refill Station. Furthermore, the grassroot community initiative 'Transition Town Milton Keynes' could influence the implementation of Refill. This is a group of local people who aim to connect and support individuals and community groups to build strong and resilient communities in Milton Keynes (TTMK, n.d.).

Table 5 Overview of stakeholders related to Milton Keynes' efforts to conserve drinking water and plastic waste

Governance Level		Urban Water Governance Stakeholder	Societal Layer	Description of task in water governance sector
Supranational	1	European Commission	State	The European Commission adopted the first plastics strategy and established the Water Framework Directive (WFD).
National	2	Department for Environment, Food and Rural Affairs (DEFRA).	State	The UK government consists of 25 ministerial departments. The most influential department concerning plastic pollution reduction is the Department for Environment, Food and Rural Affairs. This department plays a major role in people's day-to-day life, including the UK drinking water.
	3	Environment Agency (EA)	State	Regulator and licensor of waste management and disposal
	4	Waste and Resources Action Programme (WRAP)	Civil Society	WRAP works with governments, businesses and communities to deliver practical solutions to improve resource efficiency. Their mission is to move towards a sustainable, resource-efficient economy such as re-thinking how people use and consume products. One of their focus sectors is plastics. An initiative of WRAP is the UK Plastics Pact, which brings together businesses from across the entire plastic value chain with UK governments and NGOs to tackle the scourge of plastic waste.
	5	City to Sea	Civil Society	City to Sea is an NGO campaigning to stop plastic pollution. Their mission is to connect people´s actions to the impact on the oceans, by giving people and businesses from all backgrounds simple ways to make a significant difference.
Regional		Anglian Water	Market	Anglian water supplies water and water recycling services to more than six million

Milton Keynes level	6			domestic customers, including the city of Milton Keynes. The water company aims to raise awareness about how essential water is to sustaining life and the importance of water to people every day, the health of the environment and the economy.
	7	Milton Keynes City Council	State	Milton Keynes Council (MKC) is the local authority of the Borough of Milton Keynes. The council provides many services to the citizens and local businesses of Milton Keynes, including waste collection and recycling.
	8	Transition Town Milton Keynes	Civil Society	Transition Town Milton Keynes is a group of local people who aim to connect and support individuals and community groups to build strong and resilient communities in Milton Keynes.
	9	Citizens	Civil Society	Citizens and businesses of Milton Keynes are the target groups of the Refill project. The project aims to reduce plastic pollution by providing the alternative of refilling bottles at a Refill station. In this way citizens re-use water bottles and buy fewer single use plastic water bottles.
	10	Local businesses	Market	The participation of local businesses located in Milton Keynes is essential for the Refill project since they would become Refill stations. Citizens can fill their water bottle at these shops and businesses.
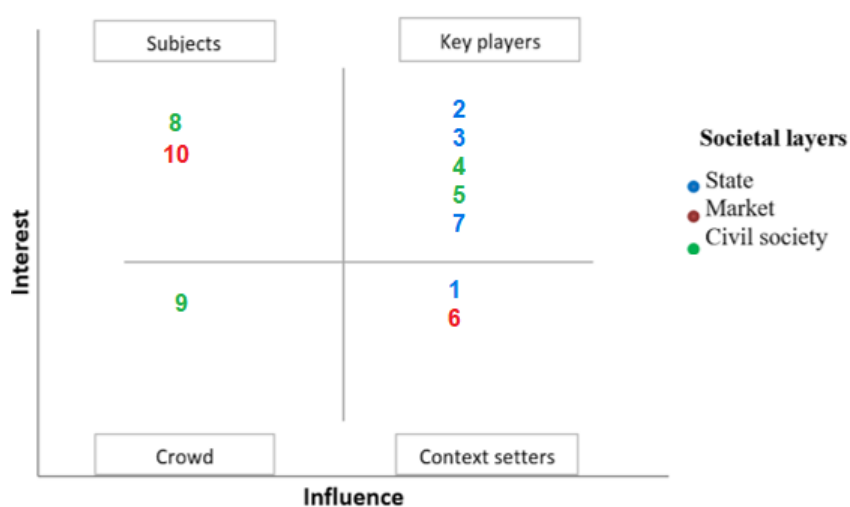
Figure 6 Analysis of the stakeholders involved in Milton Keynes. The numbers correspond to the stakeholder numbers presented in Table 5

Milton Keynes' governance capacity

In order to conserve water in Milton Keynes, the city requires sufficient governance capacity. Figure 7 displays Milton Keynes' governance capacity regarding water conservation. This governance capacity integrates the actions of multiple private and public stakeholders relevant for water conservation in Milton Keynes. Figure 8 shows the aggregate scores for each governance condition. Subsequently, each condition is discussed more in detail using the 27 indicators.
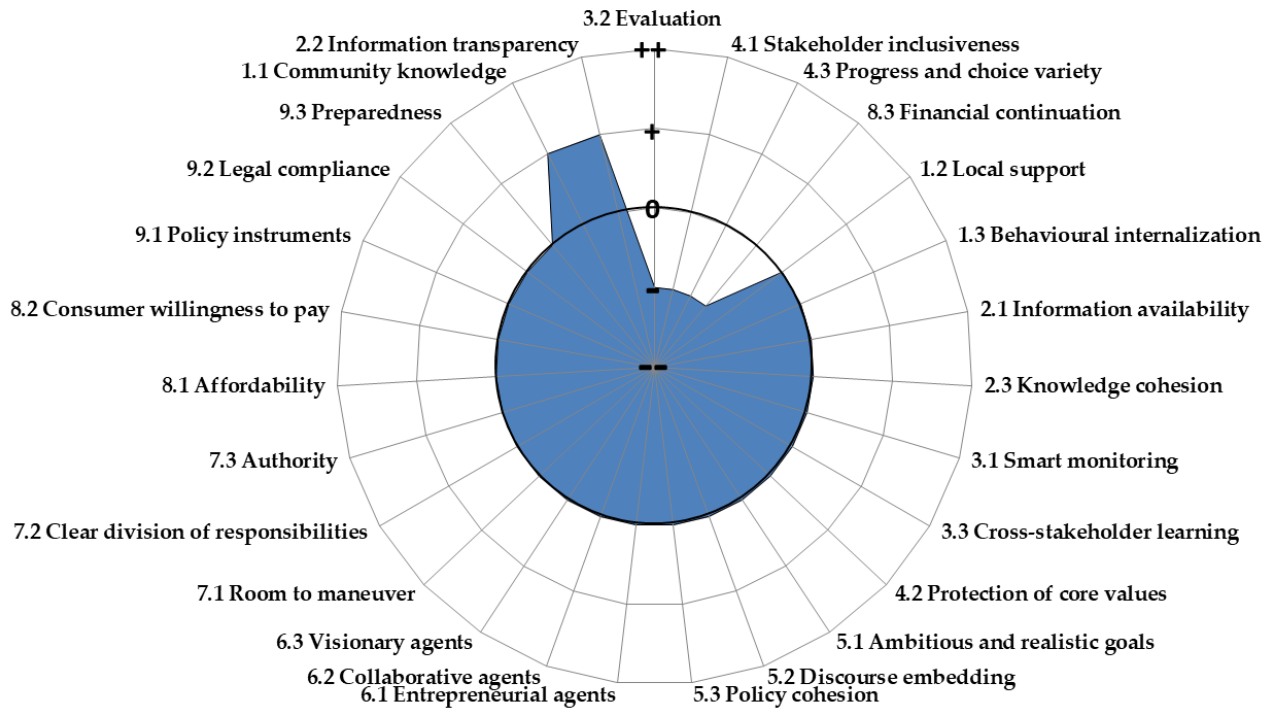
Figure 7 Governance Capacity of Milton Keynes. Depicted are the scores that the city of Milton Keynes received for each of the 27 indicators in respect to drinking water conservation.
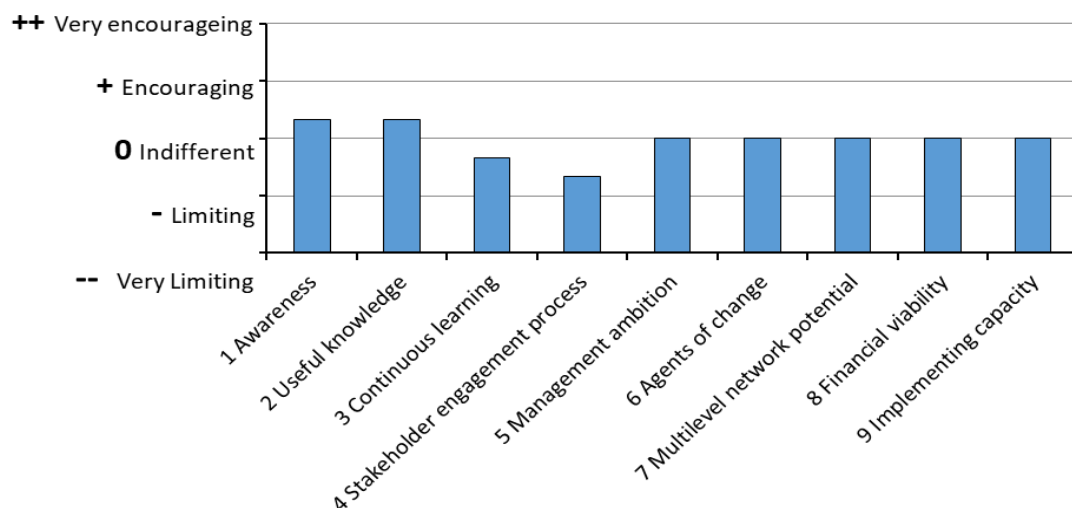
Figure 8 Governance Capacity of Milton Keynes, by each condition. Each condition is the average of the corresponding three indicators, as seen in Figure 7, with respect to drinking water conservation

Condition 1: Awareness

In the last decade, people in the UK have become more aware of plastic pollution (M.GC:1; BBC, 2019). In accordance with the increased national awareness, citizens in Milton Keynes and the wider region are becoming increasingly aware of the plastic pollution issue. Publicity about the negative impacts of plastic pollution has increased the knowledge of the community, including the British documentary Blue Planet II. This programme led to a lot of press coverage and research about the extent to which plastic has infiltrated the environment, it is also referred to as the 'Blue Planet Effect' (Pozniak, 2018). According to one interviewee (M.GC:1), school children are especially aware of how plastic gets into the food chain which they also communicate to their families; "*they take that message back to their family and try to stop their parents from environmentally unfriendly behaviour".* This is also of importance for the Refill project since awareness on plastic pollution has already been raised across the UK. The Milton Keynes DSP also has an article on plastic pollution 'Cleaning up the water environment'.

The UK government is seeking to promote sustainable consumption. There are policies around sustainable production and consumption which are incorporated into other policy areas such as water, energy, food, waste or transport (M.GC:5). DEFRA has a major focus on waste within its policies and they published a 25-year plan to improve the environment. In the foreword from Prime Minister Theresa May much attention was paid to plastic waste: "by tackling the scourge of waste plastic we can make our oceans cleaner and healthier" (DEFRA, 2018, p.4).

DEFRA also works closely together with the charity WRAP. This programme also promotes sustainable waste management and has started multiple initiatives to reduce plastic pollution, including the effort to create a circular economy for plastics. As mentioned previously, Refill has not been implemented yet in Milton Keynes, but according to (M.GC:1) a councillor of Milton Keynes expressed an interest in the project in May 2018. This councillor asked for more information about how the council can get involved. Consequently, the local coordinator of the NGO City to Sea was contacted and they provided information how the council could sign up. Besides this, a new strategy on plastics is being written and will be finalised by the recycling team of the Milton Keynes Council (M.GC:1).

Although awareness regarding the negative impacts of plastic pollution is increasing across the UK and in Milton Keynes, the consumption of plastic water bottles does not seem to decrease. Keep Britain Tidy chief executive Allison Ogden-Newton found that "too many people still find it challenging to fill up on the go, while many more are still embarrassed to ask for tap water, worried about the safety of the water fountains, or just unwilling to go the extra mile and carry around a reusable bottle" (Keep Britain Tidy, n.d.). The council of Milton Keynes does motivate behaviour change through programmes including the Living Streets Project and the INTENSIFY project. The latter aims to reduce carbon so this will also include sustainable consumption. According to an interviewee, these initiatives "*have taught us that peer group pressure works well, as do messages that are made memorable by people arriving at their own conclusions or the information was presented in a way that was upbeat and fun. Positive reinforcement works better than making people feel guilty about their lifestyle choices*" (M.GC:1). Although Refill is not implemented yet in Milton Keynes, there is progress and a plastics strategy is currently under development by the Milton Keynes Council.

Condition 2: Useful Knowledge

Information on plastic pollution in general is available through policy documents of the national government. In 2017, the UK government published a report examining the trends and implications of plastic pollution in the sea. This document provides a lot of information on plastic pollution and also discusses how contamination of the natural environment with plastics can have a range of negative effects on the environment and human well-being in the UK (Thompson, 2017).

Information about Refill can be obtained in various ways. The main source for information on the project is the NGO City to Sea, which provides information on their website and social media pages. Besides the national and regional coordinator from City to Sea, local coordinators from other municipalities can provide information. These municipalities also have a better understanding of the barriers that could hinder the

implementation of Refill. Lastly, information can be found on the App (M.GC:2). This App shows the locations of businesses that participate in the project, and thus where people can get their bottle refilled. When someone refills their bottle they collect points: "*a certain amount of points entitles someone to earn a free reusable bottle*" (M.GC:9). Besides information on the App, City to Sea also provides stickers for local businesses that participate in the project for the window shops (M.GC:5).

Information on the project is easily accessible and publicly available. At Refill Oxford there is a Facebook group where local actors share insights on different schemes, as it could be beneficial to learn from people operating in different cities or regions. According to one interviewee , there is a "*challenge for water companies in the UK, because they are independent corporate bodies. They like to share what went well (e.g. in conferences on water efficiency), but they do not often share the data*" and insufficient service delivery due to droughts, leaks or other incidences (M.GC:5). This barrier to transfer knowledge and learning must be overcome. Furthermore, this interviewee emphasizes that "*there are a couple of mechanisms through which people do have this kind of more casual conversations. For instance, Water UK Industry Research Group have regular meetings where people share information about different programmes or projects and there are a couple of other coordinating bodies such as UK Water Partnership. The challenge that has been identified with Refill is actually not just about Refill but about how knowledge is shared and how learning happens in the water sector more generally*" (M.GC:5). The project partners in Milton Keynes have spoken with fellow officers in neighbouring councils about Refill and have attended regional water events to discuss POWER, Refill and ways to encourage behaviour change. However, Milton Keynes City Council is not allowed to lead the Refill campaign within Milton Keynes.

Condition 3: Continuous Learning

The government of the UK does monitor the impacts of plastic pollution, and also on a more regional level the success of the Refill project is monitored. Water companies are responsible for monitoring the drinking water quality and thus also how plastic pollution influences water quality. Since the monitoring of plastic is not arranged in one place, national or cross-sectorial monitoring and evaluation seems to be lacking. Cross-stakeholder interaction can foster a form of innovative cross-stakeholder learning, which could produce essential knowledge necessary for implementing adequate plastic waste solutions. One issue raised by a local coordinator from the Refill Colchester scheme was the lack of sufficient information for evaluative purposes. As no data from the App was provided to this local actor, the only data received is drawn from participating businesses. Knowing how many people downloaded the app in Colchester and which Refill stations are most used was argued to hold significant potential to evaluate implementation strategies, and therefore learn and improve (M.GC:9).

All stakeholders are free to interact with each other, and there has been a history of collaboration between different organisations. On a national level, water company Anglian Water has worked with City to Sea on other campaigns, such as Switch the Stick. This is a behaviour change campaign which aims to stop plastic pollution by persuading people to stop throwing cotton buds down the toilets, "*it is for Anglian Water important to make customers understand the impact of the things that go into the sewer network. When City to Sea contacted Anglian Water about the Refill project it led to a successful launch in Bristol. City to Sea had an interest in launching Refill in Norfolk, and hence contacted Anglian Water*" (M.GC:2). In Colchester and Norwich there was a collaboration between Anglian Water and City to Sea, where also the local council and a university were involved (M.GC:2).

Milton Keynes Council has worked with Anglian Water previously in other projects and now they also work together on the Refill project. The collaboration between city councils and NGOs is sometimes made difficult because often the NGOs would like to have financial compensation. "*There are occasions when what the local community group is trying to do can cause some friction (e.g. solar panels on Council owned rooftop)*"

(M.GC:7). The rules of Refill however state that it is not allowed for the council to solely lead the project, instead it needs to be a not for profit organisation.

Condition 4: Stakeholder Engagement Process

At present, citizens are not actively involved in the Refill project. Milton Keynes Council is still looking for a partner to actually implement the project in Milton Keynes. A potential partner could be Transition Town Milton Keynes, which is a group of local people who aim to connect and support individuals and community groups to build strong and resilient communities in Milton Keynes. They also have a track record in educating about environmental issues.

Condition 5: Management Ambitions

Milton Keynes was designed to be an efficient green city for a quarter million people and it continues to be a national frontrunner in issues relating to sustainability (Barkham, 2016). This green town enables experimentation of new initiatives and fosters implementation of sustainable practices. According to an interviewee, the value of water is shared by everybody and it is always a shared interest to reduce plastic waste from both the business and community side (M.GC:6). However, there are different levels of understanding. For example, when talking about organising giveaway bottles for the launch, Milton Keynes Council proposed to provide reusable plastic bottles. However, it can be argued that the aim should be to stop using plastic in general, not only single-use plastic.

The NGO City to Sea does have clear mission: "Currently, less than 30% of people in the UK drink tap water in a reusable bottle, despite the fact that we are lucky to have some of the best quality, free drinking water in the world. Refill makes refilling a reusable water bottle easy, fund and more socially acceptable than buying a single-use plastic drinks bottle. We aim to stop millions of plastic bottles at source each year, preventing plastic pollution from entering our rivers and sea" (Refill, n.d.).

According to one interviewee (M.GC:4), there is an unclear division of responsibilities as water policy in the UK crosses many administrative boundaries. As a result, stakeholders shift responsibilities to one another which leads to a situation where nobody considers themselves to be primarily responsible for certain activities (M.GC:4). There are many different agendas between the different governmental departments, which is a barrier for cooperation on sustainable consumption. Efforts are made to try to bring them together as can be seen in the recently published 25 Year Plan to improve the environment (DEFRA, 2018). More attention should however be on cooperation between the national and local governments, and also between the local governments. Since Refill is already successfully implemented in other cities, Milton Keynes can learn from them.

Condition 6: Agents of Change

There have been small-scale pilots implemented in Milton Keynes aimed at minimising waste and promoting sustainable consumption. The Waste team of Milton Keynes does regular recycling campaigns often paid for by the Waste and Resources Action Programme. One of these projects is Captain Green, which included cash prizes of 25 pounds which were given to selected citizens who properly sorted their rubbish. Both the sustainability team and the recycling team are supporting the implementation of Refill in Milton Keynes. In contrast, City to Sea, Anglian Water and some other City Councils are working together to establish Refill in other local authorities. There is trust between the different partners and people are open to receiving constructive criticism. It is also important that there are partnerships between these different organisations to solve the issue of single-use plastic "*because there is not one problem owner and the solution are multi-stakeholder as well. Deep processes of change cannot be created for single-use plastic (in connection with water and sewage) without multi-stakeholder approaches*" (M.GC:5). There is a local policy on single use

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

plastics, including water bottles which encompasses a long-term strategy and short-term targets in order to ensure implementation.

After meeting face-to-face with two of its members, an interviewee at the Council identified Transition Town Milton Keynes as having the potential to show leadership on this project due to their enthusiasm and readiness to put ideas forward (M.GC:4). Nonetheless, so far leadership in terms of seeking to bring actors together and willingness to experiment (Gerlak & Heikkila, 2011) was exerted by the Council officer advocating for the project but has not been endorsed by those who have the powers to actually approve the initiative and get it started.

Condition 7: Multi-level Network Potential

All actors in the water and waste governance network of Milton Keynes have specific responsibilities and tasks. There is however room for actors to develop new dynamic collaboration, as has been shown in other projects that have been implemented in Milton Keynes. In such projects, the council collaborated with the local community, the water company and other NGOs. Refill Colchester is a collaboration between City to Sea, Anglian water and the local council. At Colchester council there is a staff member in charge of supporting the volunteer. The volunteer runs the projects, whereas the water company provided publicity and materials. However, the volunteer and the regional coordinator realised that there was too much input from the water company at the start of the project. This led to the formulation of a clear division of roles and responsibilities, rather than having organisations work on the project individually (M.GC:6). For Milton Keynes it is thus also very important that different responsibilities are formulated very clearly, but that it does not create a highly fragmentised approach to address plastic pollution.

City councils are an important factor in sustainable consumption programmes because generally, the citizens and organisations have trust in their council. Although councils have the will to promote sustainable consumption, they have statutory obligations to meet such as education, social care, environmental health, housing, waste collection and disposal, and strategic planning. The council has to ensure the tax payers money is spent in a responsible way and that budget allocation is approved by councillors and directors. According to an interviewee (M.GC:1), "*sustainable consumption may not be a prime concern for most citizens and the councillors and directors need to deliver what is important for their citizens. I do not believe city councils can make people change their behaviour; we can inform and encourage sustainability but not enforce change in the UK*". On this issue, other interviewee commented that the authority of the city council is limited: "*the main power that they have on the water consumption side is through the planning process: they can put rules in place that developers must abide to, but they have no authority to enforce a certain behaviour afterwards, e.g. a developer puts water efficient showerheads, but home owners can easily change it back to a normal one and the council cannot do anything about that*" (M.GC:3).

Condition 8: Financial Viability

Refill is a project that can save money for citizens, since the average person in the UK will use 150 plastic water bottles every year (Water UK, 2018a). The project aims that people refill their water bottles instead of buying a new one. In that sense, this project is affordable for citizens. Since an agreement was made in January 2018 between City to the Sea (the NGO which initiated Refill) and Water UK (the industry body representing water companies across the UK) water companies agreed to participate in the national roll-out of Refill (Water UK, 2018b). The agreement involved providing financial resources to hire regional coordinators and to develop a new App as it was foreseen that difficulties would be experienced when the number of users begins to grow significantly.

Austerity measures and the economic climate have had an impact on the funding of local government services. The central government funding has been reduced and many of the local governments in the UK are struggling financially, so it can be difficult to convince councils to participate in the Refill initiative (M.GC:3; M.GC:5), "*a lot of councils are cutting back on public services*". The financial difficulties faced by Councils across the UK may hinder Refill's spread. Governmental funding to local authorities has decreased by 49.1% between 2010-11 and 2017-18, and local authorities' average spending power – which includes government funding and taxes – has dropped by 28.6% during the same period" (National Audit Office, 2018, p. 4). Northamptonshire County Council declared bankruptcy in February 2018, which had not happened in the UK for the past 20 years (Fogg, 2018). Devolution of local government within England since 2014 had an enormous impact on the composition of the local governments, which means that decisions are made closer to the people. According to the UK government "devolution is one of the most fundamental changes to the ways decisions are made for local areas and how public services are funded' and 'devolution is the transfer of power and funding from national to local government. It is important because it ensures that decisions are made closer to the local people, communities and businesses they affect" (Local Government Association, 2018a). This devolution thus led to an increase in responsibilities of the local government, but at the same time the funding has been reduced and will be even further cut in the future, "main government grant funding for local services will be cut by a further £1.3 billion in 2019/20 despite many councils already struggling to balance their books, facing overspends and having to make in-year budget cuts" (Local Government Association, 2018b). As mentioned previously, the council has to ensure that the tax payers' money is spent in a responsible way. Reducing plastic waste is currently not the most important item on the political agenda (M.GC:7).

Condition 9: Implementing Capacity

Currently, Refill is not yet implemented in Milton Keynes so policy instruments are lacking. According to an interviewee, policy instruments can only be applied effectively if the local council takes interest in the matter (M.GC:3). To promote compliance amongst citizens to reduce plastic pollution for instance communicative or financial instruments or enforcement tools can be implemented. According to respondent (M.GC:1) "*councils could introduce charges for unsustainable behaviour, but this would have repercussions: the councillors who approve the charges are at risk of losing votes for their political party in the next election*". It can thus be questioned if penalties will be implemented in Milton Keynes as it could influence the popularity of the local political party. There are not many policy instruments used by the authorities in order to change unsustainable behaviour in Milton Keynes. One responded highlighted that there are limits to what policies can do "*they cannot change how people think or their entire environments, policies have to be practically enforceable. From a systems point of view (rather than targeting the behaviour of individual consumers) they could look at manufacturers, that is a way of expanding it and looking at the whole environment in which consumption originates*" (M.GC:3).

Concluding remarks on the governance capacity of Milton Keynes

In Milton Keynes, people are becoming increasingly aware of the issue of plastic pollution. The UK government reflects the importance of sustainable consumption for instance by the implementation of the 25-year plan to improve the environment which includes the sustainable management of plastic pollution. In addition, the local government also acknowledges the issue as it is currently developing a plastics strategy. Nevertheless, awareness and knowledge of the issue does not necessarily lead to behaviour change. The general public does not change their behaviour as a result of becoming more aware of plastic pollution. Information about the Refill project is not actively distributed amongst citizens because it is not yet implemented in Milton Keynes. However, if citizens want to know more about the project there is an article on Refill in the POWER DSP and information is easily accessible and publicly available. In Refill schemes that have already been implemented in other UK cities online platforms are used where local actors can share insights, such as Facebook. It could be beneficial for the initiators in Milton Keynes to use these platforms as it will stimulate cross-stakeholder learning. An important barrier to learning between stakeholders in Milton

Keynes is that water suppliers in the UK are not willing to share data, but merely success stories. This is related to the privatization of the water industry in the UK, which means that information that the water companies comprise of is proprietary.

A long-term vision has been created for the Refill initiative. The implementation of Refill in Milton Keynes is a work in progress. It is important that there is leadership and commitment to the project, but at the same time it is important that not one single organisation is responsible for the implementation since solving the issue of single-use plastic requires a multi-stakeholder approach.

4.2 Milton Keynes' experiences with collaborative learning

In this section, specific aspects of collaborative learning are examined with regards to the use of plastic water bottles in Milton Keynes. In this analysis, experiences with collaborative learning in the Refill project are examined.

Learning Products

As discussed in the methodology in Section 2.2, there are two types of learning products: cognitive changes and behavioural changes. The learning products that are found in Milton Keynes are discussed in this section.

In recent years, the UK government has been seeking to promote sustainable consumption via behaviour change policy (Revell, 2013), providing an adequate context for the spread of Refill. One interviewee (M.CL:4) mentioned DEFRA's collaboration with the Waste and Resource Action Programme (WRAP) on a variety of sustainability-related initiatives, with an increasing focus on single-use plastic. The UK government's 25 Year Environment Plan (DEFRA, 2018, p. 83) devoted one of its six chapters to "Increasing resource efficiency and reducing pollution and waste", with one major commitment being to "work towards eliminating […] all avoidable plastic waste by end of 2042". To achieve this objective, a consumption-side measure stated is to help the water company's national Refill roll-out, as well as businesses and transport hubs so that single-use bottle consumption decreases. A strong support from the government could increase the effectiveness of the campaign.

At the local level, addressing plastic waste may not be a priority to citizens, and in that case, Councillors are unlikely to support programmes such as Refill. According to an officer from the Milton Keynes Council (M.CL:6), littering is important to citizens: *"[Littering] is perceived as an issue by citizens, but when I walk around the city myself, in comparison to other cities within the UK, I think we're probably quite good. But because it is perceived as an issue by citizens that will affect their interactions with their elected representatives. So… it's an issue"*. Recent DEFRA data indicates that 28 to 30% of people perceive litter and rubbish lying around their neighbourhood as a problem (Environmental Audit Committee, 2017, p. 9). The influence of citizen perceptions of littering and their impact on political will at the local level could yield influence on a Council's decision to take part in Refill. The links between littering and the greater environmental impact are clearly outlined in the 'Cleaning up the water environment' page on the Milton Keynes DSP.

Increased media attention on plastic pollution has contributed to bringing the issue to public attention (Jaffee & Newman, 2013). Awareness can indirectly influence Councils' decisions to act on the problem as their citizens become dissatisfied with litter and waste. Awareness can also contribute to the success of Refill because environmentally-aware people might be more likely to participate in the scheme, either as users or as participating businesses.

Programmes targeting plastic waste such as Refill have a strong focus on individual behaviour change, which is partly enacted by providing information. Initiating and implementing a Refill scheme is facilitated by existing levels of citizen awareness and actions by interested potential partner organisations, namely public authorities at various levels and water companies, which are themselves influenced by public awareness. However, even with high levels of environmental awareness, citizens might not prioritise addressing plastic litter in a context of competing priorities in council finances.

Learning Processes

Learning processes include the process of acquiring, translating and disseminating information. The major source of knowledge on Refill is from the NGO City to Sea and Anglian Water. A Council employee of Milton Keynes has been in contact with the Refill regional coordinator for the Anglia region, expressing interest and asking for more information about how to set-up Refill in Milton Keynes (M.CL:1).

In the Refill scheme of Colchester, the regional coordinator (M.CL:8) acquires information from stakeholders involved via different means, including emails, feedback forms, meetings, and one-to-one conversations to gather more in-depth information. Information is processed through deliberation and comparison with other schemes, although it was mentioned that what works in a certain area might not necessarily work everywhere. Therefore, analysis and gaining a general overview of the specific project being run seemed important to information processing. On an individual level, the information acquired and processed by the regional coordinator has not significantly changed how schemes are supervised. The coordinator disseminates information to all parties involved that draws on experience gained during previous Refill initiatives, which is how others acquire most information. This process of information acquisition, translation and dissemination undertaken by the regional coordinator occurs somewhat similarly across all schemes. The regional coordinator of Colchester (M.CL:8) explains that Anglian Water oversees public relations, provided publicity, including via social media outreach, and provided some promotional material such as a banner previously used for Refill Norwich and some stainless-steel water bottles to give away to people who downloaded the App or expressed interest about the scheme on social media. The Colchester Borough Council allocated one staff member and a Zone Warden team, who is usually responsible for solving benign community issues, to assist with Refill. However, this was not an official support. The Council staff answered to emails from interested businesses and connected them with the local coordinator, and managed the spreadsheet used by all the actors involved in the scheme's implementation. The Zone Warden team discussed Refill in cafés, bars, restaurants, as well as housing associations. Similar activities where conducted by the volunteers supervised by the local coordinator. The Council also shared knowledge about festivals and other public events taking place in the area, where promotional work could be conducted (M.CL:8). The regional coordinator in Colchester explains that e-mail and calls were the main form of ICT used to disseminate information with actors involved and to reach out to others potentially willing to contribute. The local coordinator also used Facebook to recruit a team of volunteers as well as to acquire information on actions undertaken in different Refill initiatives (M.CL:8).

The local coordinator of Refill in Oxford (M.CL:7) sends updates to Refill every two weeks and send queries once a month. Therefore, communications can be characterised as regular but weak. Besides emails, the major use of ICT is contact via a Facebook group for Refill initiatives operating in South Eastern England on which insights are shared by local actors involved in different schemes. The local coordinator receives information from Refill when necessary but mostly relies on personal expertise that stems from a background in marketing and communication. While a very limited amount of resources was provided by Refill at first, this has improved as more initiatives were launched. A centralisation of resources occurred, with generic information on how to start a campaign and how to use social media being provided to local actors. No changes in strategies or goals were identified since the start of the project (M.CL:7).

In the case of Norwich, Refill had a significant role to play in disseminating information about past experience and best practices to the stakeholders involved in the collaboration. After the launch, Anglian Water drew information from Refill via the national or regional coordinator, from the local coordinator about what happens on the ground, from the App which shows how many Refill stations have been established, and finally from social media (M.CL:10).

Institutional Structure

In this section the institutional structure in Milton Keynes is discussed. Collaborative contexts can differ extensively based on who participates in the collective, what roles different actors play, and how those roles are structured. Therefore, in this section the roles and responsibilities of different actors in Milton Keynes are examined (Heikkila & Gerlak, 2013).

Milton Keynes is one of the municipalities currently considering setting-up a Refill scheme. While the roles and responsibilities of participants in Milton Keynes are not yet established, some institutional elements from the context in which the collaboration are taking place. Anglian Water owns the entire water infrastructure and is responsible for delivering water and sewage services within its geographical area which includes Milton Keynes (Barrett & Wallace, 2011). The water company must ensure that water complies with EU quality standards (regulated in the UK by the Drinking Water Inspectorate, a department of DEFRA). DEFRA also plays a role by setting the overall water and sewage policy framework in England through the department Ofwat (Ofwat, n.d.). The Milton Keynes Council collects domestic waste and recyclable materials and pays for litter clean-up costs. Basic waste principles and definitions were laid out by the EU, stipulating that the handling of plastics should follow the four R's: reduce, recycle, re-process, recover. Councils are also increasingly responsible for promoting sustainability in their area by setting-up or supporting programmes working towards this end. Indeed, since the 'Big Society' agenda and the 2011 Localism Act, some powers have been transferred from the central to the local level, including responsibilities for action on environmental sustainability given to individuals, local communities and local governments (Revell, 2013).

In other Refill schemes it was found that actors involved worked on different aspects of the project independently, resulting in few opportunities for collaborative learning because knowledge is not systematically shared (M.CL:7; M.CL:8; M.CL:10). This fragmentation is not necessarily negative as it might make the project progress faster and can work well when actors have specialised skills provided that it is well coordinated. Nevertheless, some actors are more knowledgeable in one area, for instance Anglian Water in social marketing, and communications might benefit from including a greater array of opinions (M.CL:2; M.CL:8). Such a redefinition of roles should rest on novel communication helped by technology in order to reduce the transaction costs induced by more frequent communication. Collaborative learning is more likely to happen when people work together rather than a strict distribution of relatively independent tasks between actors who do not meet regularly.

At the micro-level, the role of individual perceptions and preferences has been documented. Some UK citizens feel uncomfortable asking for bottle refills in businesses, while others believe that the tap water is unsafe to drink (Centre for Social Innovation, 2017). The way Refill currently operates addresses the lack of freely available drinking water in city centres and people's reluctance to ask for water refills in water businesses. Current communication campaigns can also be used to promote the safety of tap water. One additional idea, discussed by a Refill regional coordinator (M.CL:5) and also proposed by Holt (2012), is to further enhance access to water in public spaces by building public water fountains. Building public fountains goes one step further in considering social practices in sustainable consumption programmes by improving the infrastructural domain in which consumption takes place. According to one expert (M.CL:4) in sustainable consumption: "*Refill is a really good campaign, and really important too. But that should be considered alongside other types of public provision*". However, according to an employee of the city council (M.CL:9)

there are also factors that might prevent the construction of public fountains, for instance the costs both in terms of the construction of the fountain and the ongoing maintenance.

Social Dynamics

In this section the social dynamics within and between actors in Milton Keynes are discussed. Social dynamics can play a key role in promoting and obstructing collaborative learning, and includes variables such as inter-personal trust, open communication and leadership (Heikkila & Gerlak, 2013).

The Refill initiative is being considered by the Council of Milton Keynes, but no formal partnership has yet been established (M.CL:1). The project has been stalling since decision-makers learned that Refill prohibits councils from taking the lead. Consequently, a Council staff member (M.CL:1) is currently reaching out to NGOs and received an enthusiastic answer from Transition Town Milton Keynes. Another possibility for local involvement might have been found by the Refill regional coordinator (M.CL:5), who is trying to get a local resident to start Refill in the city.

Staff members from the Milton Keynes Council sustainability team are in regular contact with staff from the water company's education and sustainability team. The Council staff member looking into Refill believes that the goodwill desirable for collaborative work built over time during past common projects are present for Refill and water efficiency programmes more generally (M.CL:1). The Council has also been working on past projects with Transition Milton Keynes. While Refill has not been previously involved with either the Council nor the NGO, it has worked with the water company on other Refill initiatives, including in Norwich and in Colchester (M.CL:8; M.CL:10).

Transition Milton Keynes carries out work related to education on environmental issue and Anglian Water worked on behaviour change campaigns related to plastic pollution and water consumption, which matches the Council's interest in behaviour change programmes (M.CL:1). Interest in this type of initiative, to which the Refill campaign belongs, is therefore shared by four organisations. City to Sea, the Council, the water company and the local NGO all expressed interest in solving issues related to plastic usage more specifically. These common points were identified as a potential reason for people's high response rates to emails sent by a Council employee about the Refill campaign (M.CL:1). So far leadership in terms of seeking to bring actors together and willingness to experiment (Gerlak & Heikkila, 2011) was exerted by the Council employee advocating for the project but has not been displayed by those who have the powers to actually approve the initiative and get it started (M.CL:1). The interviewee also argued that involved actors should be tolerant to constructive criticism when the project progresses because it breaks new ground locally (M.CL:1). This argument implies that constructive criticism could play a part in learning efforts while working on this new programme. Instead of relying on a formal mechanism to resolve conflicts, it is hoped that conflict resolution will rest on actors' professionalism and experience.

Collaboration is needed when an actor cannot solve an issue on its own (Emerson et al., 2012). The following practical benefits resulting from involving multiple actors were mentioned by Milton Keynes Council employees: the potential synergistic effect created by different types of expertise complementing each other, and the distinct networks that actors have. As one Council employee stated (M.CL:1): "*I believe cooperation between the different agencies is the best way forward. Each partner has strengths that can work better through collaboration*". Also, a wider audience can be reached by each partner using their contacts to send out information.

In terms of expertise, Anglian Water – as a private company that is legally required to undertake water conservation initiatives (DEFRA, 2014) – deploys social marketing skills gained while implementing demand-side water conservation measures when designing communication campaigns for publicity, social media

outreach, and more broadly all external communication (M.CL:2). Refill, and Anglian Water to a smaller extent, have valuable experience gained during past schemes. Councils and local coordinators bring value to the partnership in terms of local network links and knowledge of the city. Anglian Water was also using the company's network with large businesses, while the Refill regional coordinator seeks to connect schemes operating near-by to enhance knowledge sharing between them (M.CL:2; M.CL:5).

Leadership seems to be understood by interviewees as a long-term and active commitment to the scheme, while Gerlak & Heikkila (2011) conceive leadership as a wide-ranging role, encompassing – among others – the ability to bring diverse interests together, ensure new ideas are fostered and actors are committed to learning, create a learning and information-sharing climate, experiment, and facilitate communication across diverse members of the collaboration. Refill makes efforts to keep leadership in the hands of local coordinators, while Anglian Water and councils more generally sometimes wish to lead the project themselves.

Technology and Functionality

In this section the technological and functional domains are discussed as they also influence how actors are organised and how they interact. It includes variables such as the capacity to process information, the adequacy of available information and the transparency of technological processes to every actor involved with the Refill scheme.

ICT is mainly used by the city council of Milton Keynes as email communication and phone calls to reach out to potential partners (M.CL:1). During the future implementation of Refill, a website is planned to be used to inform citizens about the initiative. Being one of the key demonstration cities of the POWER project, which aims to propose social responses to urban water issues, Milton Keynes manages a challenge on the Refill initiative on the DSP. Anglian Water expressed to Milton Keynes Council officers that the DSP is not user-friendly enough due to the registration requirement (M.CL:1). However, the information provided on the DSP is openly accessible while registration is only required when users want to have a discussion on the platform. In contrast to the POWER DSP, some online platforms are already being used by certain actors. Regional coordinators (M.CL:5) share ideas on Slack, an online team collaboration tool via which people can discuss and share documents, while some local coordinators communicate and draw information from Facebook (M.CL:7; M.CL:8).

Regarding the functional domain, e-mails and phone calls where deemed important to communicate within and across schemes, both in terms of information gathering and dissemination, especially as staff members from Refill and from water companies do not live in the cities where the local schemes under investigation are being implemented (M.CL:5; M.CL:8). Social media was also used to gather information and communicate with members from other schemes, which is useful to get informed fast as some information can be accessed without getting in contact with anyone (M.CL:7). The wish to learn from other schemes was mentioned by many interviewees. Some found satisfactory ways to do so, others expressed a desire to find new ways to communicate across schemes. Improving information gathering from other schemes could help information translation through comparison (M.CL:7).

The insufficient amount of data derived from the Refill App, and the lack of sharing of App data was found to hamper learning (M.CL:8). With the upcoming upgraded App improving access to information in terms of users' data, and therefore expanding possibilities for strategy evaluation, it is important that either raw data or findings deriving from its analysis are shared across members of collaborations in order to create collective learning products in the form of new shared ideas or plans (M.CL:5).

Concluding remarks on collaborative learning in Milton Keynes

The Refill initiative is currently gaining momentum. All water companies have decided to help its national roll-out, and the UK government has committed to assist these companies in this endeavour. In Milton Keynes, the project is being considered by the Council but has not started yet. Exploring collaboration processes and instances of collective learning in Refill schemes revealed the following. Most notably, while participants, their distinct roles and extent of involvement can slightly differ, all schemes undertake similar activities to implement Refill. Some instances of collaborative learning occurred in these settings. Refill staff members have an important role to play in that regard by disseminating expertise in the early stages of projects, thus influencing the strategies and plans created. The delineation of roles and responsibilities in terms of tasks overlap, which is related to the coordination of these tasks and to knowledge sharing via communication, were the most important factors influencing collaborative learning. External communication with a broad range of local people was also deemed important. Trust and the openness of discussion positively influenced actors' ability to communicate meaningfully within collaborations, and ICT played an important role in communication and information acquisition and dissemination. Leadership or shared environmental consciousness were seen as important for starting a collaboration or for its overall success but were not linked to learning by interviewees. Most notably, a lack of data accessibility was said to hamper evaluation capacity.

Insights drawn from the three cases studied as well as from academic literature can assist relevant actors in Milton Keynes when addressing three major challenges: starting the collaboration, promoting collaborative learning within it to potentially induce better-informed plans and strategies, and designing a programme that solves the targeted issue. Since Refill App can be solely used by citizens to find where participating businesses are located, the DSP could play a role as a platform where schemes can efficiently communicate with each other as well as a way to evaluate the Refill scheme by collecting user data and feedback.

4.3   Potential role of the POWER DSP in Milton Keynes to reduce drinking water consumption

Based on the governance capacity analysis and the in-depth analysis of collaborative learning provided in the previous sections, here the potential role of the DSP to strengthen the governance capacity dimensions are discussed. We focus on the first four conditions of the governance capacity framework – awareness, useful knowledge, continuous learning, strengthen stakeholder engagement – as the DSP has the potential to strengthen these conditions. The five remaining conditions of the framework are discussed together. In the end of this section recommendations are provided on how the DSP can be improved in Milton Keynes. In Box 3 below the key characteristics of the DSP of Milton Keynes are presented. These characteristics are retrieved from other deliverables of the POWER project, including D3.4 (report on the gamification model used within POWER DSPs) and D3.5 (report on the POWER engagement model).

Box 3: Key characteristics of Milton Keynes' DSP

The DSP of Milton Keynes focuses on reducing drinking water consumption. The platform has multiple objectives, including: (1) to raise awareness on the importance of water conservation and water efficiency at the household level; (2) provide information and resources on how to save money on energy costs by using less hot water; (3) improve belief of self-efficacy to reduce per capita consumption through the exchange of knowledge about water savings; (4) co-create and co-design of topical contributions from young users on water scarcity awareness and water conservation. Users can browse information about multiple topics related to water consumption in Milton Keynes, and like, comment or share this information. First, information is provided on water scarcity in Milton Keynes. It explains that Milton Keynes is one of the driest areas in the UK and that measures should be taken to reduce water consumption. It also includes information about water legislation and various documents for instance on the water strategy of Milton Keynes. Information is also provided on how to save water in the garden and home. Here, different measures are discussed that can potentially save water in the home, such as water saving gadgets which can help reduce time in the shower. The information page on saving water in the garden includes information on soil types and drought resistant planting. Users of the DSP can also do a water quiz to test their knowledge about how water is used in the UK. Furthermore, events that are organised in Milton Keynes are highlighted on the DSP such as the Milton Keynes Regatta and the Water Efficiency Event at the Milton Keynes library. Besides the online aspect, there is thus also an emphasis on offline communication including events and workshops.

Gamification techniques are used on the platform to provide additional motivation drivers and incentives to help increase user interaction with the DSPs attempting to raise awareness on reducing water consumption in Milton Keynes. An important element of the gamification model is the point mechanism that uses points to reflect the extent to which a given action contributes to increasing preparedness and real-world impact on an individual, social and political level. These gamification elements are also used within the idea contest as points are given to users that participate in the contest. After submitting an idea to the contest, other users in the community can like and/or comment on the idea. If someone has 10 likes then they receive three times as much likes. This motivates the community to actively engage with the content on the platform by reading, liking, commenting and sharing it.

Potential of the DSP to raise awareness

In general, people in Milton Keynes are aware of plastic pollution. Since the Refill scheme has not been implemented in the city yet and the consumption of plastic water bottles has not decreased, it is important to make citizens more aware of the importance of refilling their water bottles. The DSP is a potential tool to communicate information about Refill to citizens and an article on Refill was written early in 2018. To raise more awareness on the potential implementation of the Refill project in Milton Keynes, the City Council or (non-profit) organisations could provide more relevant information on the progress of the project within the

city. Furthermore, the DSP could be used to provide information to local businesses on how they could join the initiative or it can be used as a platform that brings local businesses in contact with project initiators (e.g. to ask questions or to sign-up).

Potential of the DSP to increase useful knowledge

Several interviewees noted the need to exchange ideas between those involved in different Refill initiatives. The National project Refill would benefit from setting-up a way to exchange ideas and best practices with water companies across the UK. However, because UK water companies are private entities, the information they possess is proprietary. This leads to a tendency to share some success stories, but to retain detailed data and insights drawn from less successful programmes. Moreover, interviewees expressed the wish to learn from other Refill schemes. Two employees of the Milton Keynes Council recognised the benefits that their organisations would derive from learning about how other Refill initiatives operate and to find all useful information on a single platform. The DSP enables actors to easily share ideas and best practices, to ask questions, and easily compare what has been done across many local initiatives. Another potential way to use the DSP is to share information on the implementation requirements of the Refill initiative in the form of online training. This could decrease the amount of support regional coordinators must provide to potential adopters of the scheme and could increase the pace at which schemes take off. Discussing information sharing between water companies, one interviewee stated that the solution might not be technology, but rather to improve knowledge sharing during existing opportunities for encounters. This could however entail higher financial costs than the set-up and maintenance of a DSP.

The DSP could also be used to inform citizens during the implementation phase of Refill, if it goes ahead. For instance, information on the safety of tap water and the social and environmental costs of bottled water could be provided on the website and businesses could gather information. The POWER DSP, described on the project's website as "an interactive platform filled up with information of experts about water-related issues and used to communicate these issues to decision-makers, key stakeholders, and the public in order to increase awareness" (POWER, 2017), is already used in Milton Keynes to inform citizens about various water challenges in their city. Content is written by a staff member from the Milton Keynes Council sustainability team and guest authors. Currently there is a page on the Refill project, but it does not explain the role of the project in Milton Keynes as Refill is not yet active in MK. This could be an opportunity for the DSP, not only to explain what the project entails but also to involve citizens and local businesses during the implementation phase of Refill.

As mentioned previously in Section 3.3, the DSP of Milton Keynes can meet all four types of interaction between citizens and a government in the context of ICT-facilitated public service provision. For Milton Keynes, the typology 'government as a platform' could be especially relevant. The DSP can be used by the government to educate citizens to reduce bottled water consumption. Koop et al. (2019) concluded that the provision of real-time feedback on water consumption together with behaviour influencing tactics has a large potential to enhance domestic water consumption.

Potential of the DSP to enable continuous learning

In other Refill schemes that are already implemented there is collaboration between different parties. A limitation of the DSP is however that the pages are accessible for everyone, which could for instance limit (sensitive) information sharing. The DSP is designed for interaction between citizens, politicians and professionals. This may require the development of additional functionalities within the DSP that better account for different information accessibility, in order to provide the opportunity for politicians and professionals to share non-public data. These additional functionalities could for instance include sections that are only visible for certain stakeholder groups (e.g. politicians and professionals). It should be further examined if this is feasible to be applied within the DSP of Milton Keynes or future applications in other cities.

Potential of the DSP to strengthen stakeholder engagement

One of the Refill regional coordinators explained that while she would be favourable to a DSP to share ideas, some councils and water companies stated that their capacity to invest significant levels of input is limited. As such, the Refill coordinator hypothesised that local Refill coordinators might participate the most. An idea put forward by another respondent to address this issue is to provide incentives for participants to add input. For instance, by giving away a re-usable water bottle when users collect a certain amount of points through the use of the DSP. But there are also examples of online platforms that do not provide incentives, such as Wikipedia. On this page, a vast amount of information is written by a variety of actors while there is no reward.

Potential of the DSP to strengthen additional conditions

An important finding is that in current Refill schemes the roles and responsibilities between actors involved are relatively fragmented. However, collective learning between actors involved in the Refill initiative is more likely to happen when people work together rather than a strict distribution of relatively independent tasks between actors who do not regularly meet. The DSP could induce more frequent communication between the different actors while reducing the transaction costs (e.g. invested time and travelling costs). It is of major importance that there is regular contact between different actors, since solving single-use plastic requires a multi-stakeholder approach. Hence, it seems that a DSP can, in particular, enhance multi-level network potential to address water scarcity issues (condition 7; Table 1).

Box 4: Recommendations to ensure optimal use of Milton Keynes' DSP

The DSP offers potential benefits to the Refill initiative in terms of programme design and delivery, citizen learning, and programme evaluation. To ensure the optimal use of the DSP for a local Refill campaign, we recommend the following:

1. More information needs to be provided as soon as it comes available on the DSP on the progress of the Refill project in Milton Keynes, and citizens should be involved during the implementation phase of the project by the initiator of the project. In addition, information can be provided on the implementation of the Refill project in other municipalities as an example of how the Refill scheme works;

2. Although users of the DSP can earn points by getting informed and engaging with water challenges in Milton Keynes, no material reward stems from collecting those points. Positive reinforcement could be fostered by giving tangible rewards when a certain amount of points is collected by users as a way to increase the number of visitors on the website. Potential rewards may be granted by different sponsors, such as local businesses.

---

5   Water governance, learning and the potential role of a DSP in Sabadell

This chapter presents the results of the governance analysis of Sabadell. Firstly, the capacity to govern water stress by reusing treated wastewater in Sabadell is analysed using the Governance Capacity Framework. Building on this baseline, an in-depth case study analysis of the pre-conditions for collaborative learning follows. Finally, the potential role of the POWER DSP to address reusing treated wastewater is examined.

5.1   Sabadell's governance capacity to reduce water stress by reusing treated wastewater

In this section the capacity to govern the challenge of reducing water stress by reusing treated wastewater is analysed based on the governance capacity framework (Table 1).

The governance of the water sector in Sabadell is composed of both private and public stakeholders. In Spain, the national and regional government mandate the normative and legislative contexts. Nonetheless, each municipality is ultimately responsible for the management of the water in their area. Thus, this role falls in the hands of the City council of Sabadell. This municipality, among others, has subcontracted the private company CASSA to do this. CASSA has recently become part of AGBAR (Aguas Barcelona), which in turn is predominantly owned by Suez Environment. As part of their services, CASSA has developed a dual network pipeline system in different parts of the city which uses regenerated water from the city's water treatment plants EDAR Riu Sec and Riu Ripoll, and groundwater of old wells and water mines. These plants treat 9,696,988 m^3 and 5,170,180 m^3 respectively. Of this, 90,000 m^3 is recycled and supplied through the dual network.

In order to reduce water stress by the wider application of wastewater recycling practices, major changes are required in the way the water cycle is governed at the local, regional and national level. This process requires governance capacity to overcome existing and emerging challenges that may arise. Figure 10 summarises Sabadell's governance capacity to address water scarcity by recycling. The governance capacity is a result of multi-levels of governance and the interaction of various commercial and non-commercial stakeholders. It summarises how well all the relevant organisations address the shared water challenge of water scarcity by means of recycling treated wastewater. First, the overall results are discussed (Figure 10). Second, the results for each of the nine governance conditions are discussed in more detail (Figure 11).

Table 6 Overview of stakeholders related to Sabadell's efforts to reduce water stress by reusing treated wastewater

Governance Level		Urban Water Governance Stakeholder	Societal Layer	Description of task in water governance sector
Supranational/ Multinational	1	AGBAR (As part of HISUSA and SUEZ)	Market	Spanish company dedicated to services, distribution or treatment of water.
	2	Union for the Mediterranean	State	Intergovernmental institution that brings together the countries of the Euro-Mediterranean region. They open a dialogue for a collaborative approach to tackling the water challenge of the regions.

	3	European Union Water Framework Directive	State	Established water quality, water distribution and water use norms and enforces these on the countries of the European Union.
	4	European Environment and Sustainable Development Advisory Council	State	A network of advisory bodies established by national or regional governments that offer independent advice on environmental matters.
National	5	Spanish Government	State	A parliamentary monarchy consisting of the Congress of Deputies, the assembly of senators and the judicial branch.
	6	Spanish Council for Scientific Research. Under this is the Institute of Environmental Assessment and Water Research (IDAEA)	Scientific Community	Responsible for national scientific and environmental research.
	7	El Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente (Ministry of Agriculture and Fisheries, Food and Environment)	State	The department working in the General State Administration for the proposals and implementation of the government's policy on; combating climate change, protection of natural heritage, biodiversity and the sea, water, rural development, agricultural, livestock and fishery resources and the food industry. They have a strong influence on the decisions regarding water distribution and river divergence.
	8	Environmental Advisory Council	Multi-layer	Enable public participation in the preservation of the natural heritage and biodiversity. It has 15 members representing NGOs, trade unions, businesses and farming associations, among others.
Autonomous Community of Catalonia	9	Catalan Water Agency (ACA)	State	A state-owned company of the Government of Catalonia responsible for planning and managing the region's water cycle. They revise and release permits for all water distribution schemes including those of water recycling.
	10	Government of Catalonia	State	The institution under which the autonomous community of *Catalonia* in Spain is politically organised. It is responsible for the establishment of regional norms and legislation of the water sector. Furthermore, it plays a key role in the general planning of urban developments, housing, infrastructure and transport, water and waste, meteorology and renewable energy.
	11	Oficina Catalana del Canvi Climàtic (The	State	The technical unit of the Government of Catalonia, ascribed to the General Direction of

		Catalan Office for Climate Change)		Environmental Quality and Climate Change. Promotes the establishment of climate change strategies, plans and projects in Catalonia.
	12	Aigües Ter Llobregat (ATLL)	State/Market	Regional water supply service that brings water to Sabadell. Once it reaches Sabadell, the water provider CASSA takes over.
	13	University of Barcelona	Scientific Community	As one of the leading bodies of the academia sector, is involved in publishing research and at times advising the governing bodies in the decision making process.
	14	Polytechnic University of Catalonia	Scientific Community	As one of the leading bodies of the academia sector, is involved in publishing research and at times advising the governing bodies in the decision-making process.
	15	Catalan Association of Friends of Water	Civil Society	A community association that promotes a good relationship between the Catalan population and the natural environment.
	16	Xarxa de Ciutats i Pobles cap a la Sostenibilitat (Network of Cities & Towns for Sustainability)	Civil Society	A forum of debate and exchange of information that aims to impulse the development of the Local Agenda 21s.
Province of Barcelona	17	Diputació de Barcelona (Provincial Government of Barcelona)	State	The public institution that provides direct services to citizens and provides technical, economic and technological support to the 311 municipalities of the province of Barcelona. Within this council is the "Pla de Formacio Ambiental" which provides municipalities, specialised training in environmental issues. The topics to be treated are diverse, related to saving water, energy management, environmental communication, financing, waste, noise, etc.
Comarca (County) Valles Occidental	18	Consorci Besòs - Tordera	Civil Society	A consortium of 60 municipalities of Barcelonès, Osona, Vallès Occidental and Vallès Oriental. Actively promote environmental education and the well-being of the region's rivers. They are consulted during the decision-making process.
Sabadell Municipal Level	19	Aigües Sabadell CASSA (Water of Sabadell)	Market	The private company is contracted by the City council. It is responsible for the management of the integral water cycle, who includes supply of drinking water, research, collection and treatment of wastewater, etc.
	20	City Council of Sabadell	State	The local governing body overall responsible for the management and supply of freshwater in the city and for the treatment of wastewater.

21	EDAR Water treatment plants	State/Market	Two treatment plants serving a population of 200,000 inhabitants of Sabadell and the neighbouring Sant Quirze del Vallès. The Sant Pau de Riusec Plant has a physical-chemical and biological treatment with MBR technology (Membrane BioReactor), and the Riu Ripoll plant has a biological treatment.
22	ADENC Ecological Association	Civil Society	Ecological non-profit association that promotes environmental conservation through educational campaigns, projects and collaborations with other associations.
23	Neighbourhood Communities	Civil Society	Aim to serve as a platform of communication for the citizens.
24	Citizens	Civil Society	Consumers of the freshwater and users of the wastewater treatment systems. Pay through taxes as well as the water tariff.
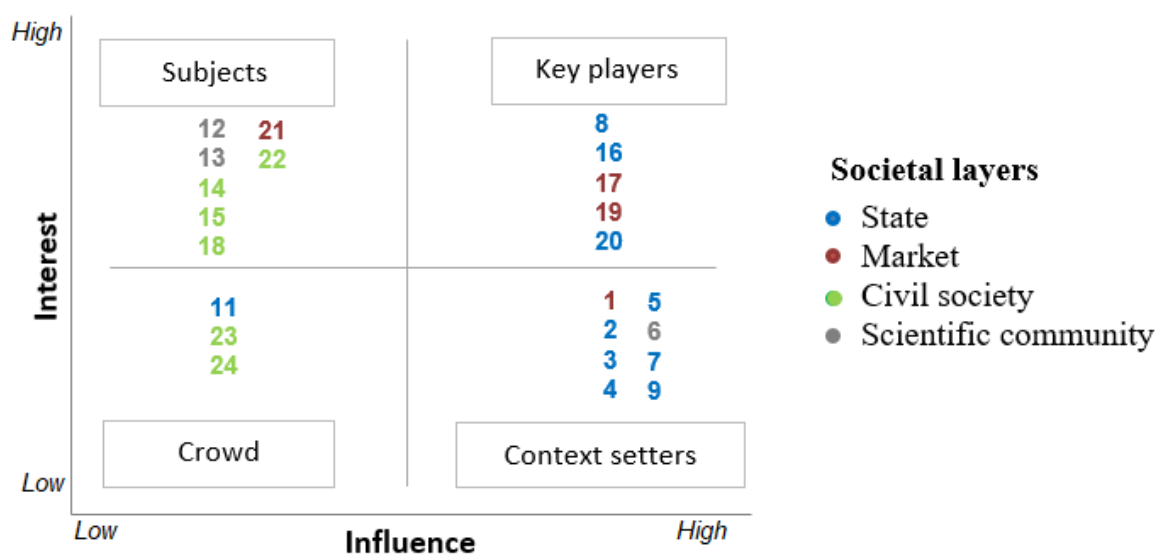
Figure 9 Analysis of the stakeholders involved in water reuse in Sabadell. The numbers correspond to the stakeholder numbers presented in Table 6

Sabadell's governance capacity

In order to reduce the water stress and implement water recycling, Sabadell requires sufficient governance capacity to do so. Figure 10 displays Sabadell's governance capacity regarding recycling of wastewater. This governance capacity shows the shared ability of stakeholders in Sabadell to address the water challenge. Meanwhile, Figure 11 shows the aggregate scores for each governance condition. Subsequently, each condition is discussed more in detail using the 27 indicators.
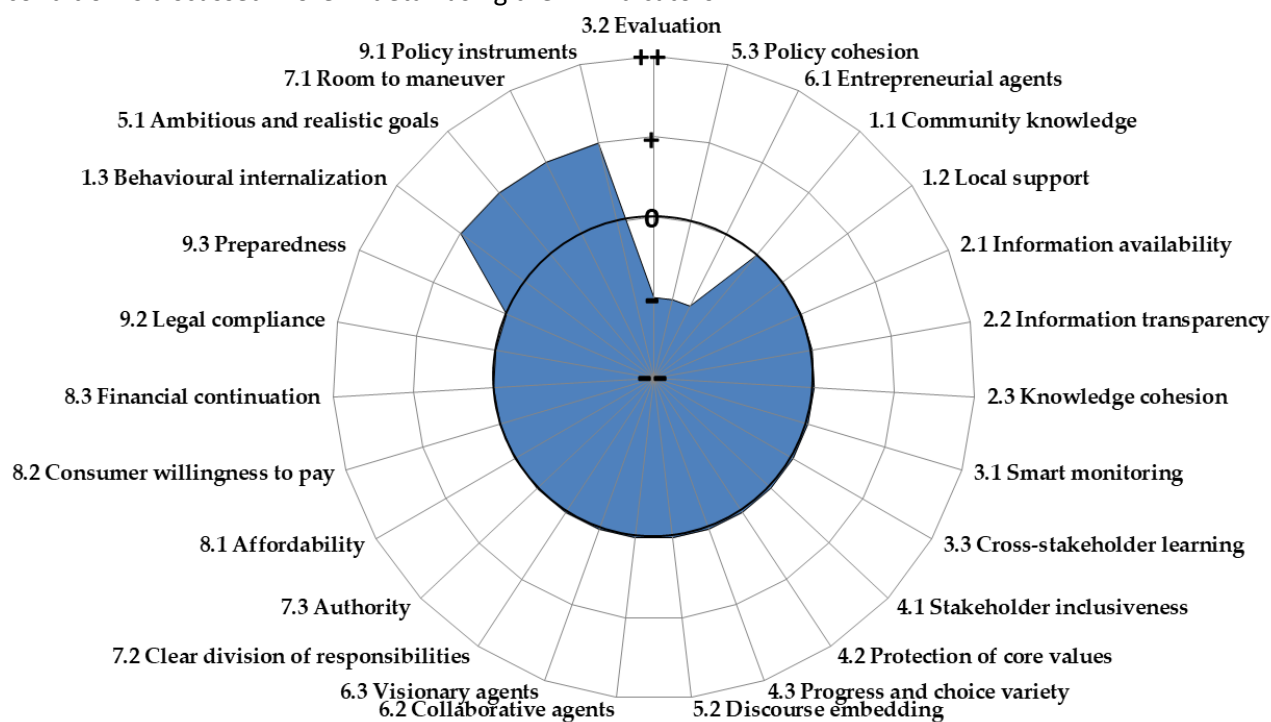
Figure 10 Governance Capacity of Sabadell, by indicator. Depicted are the scores that the city of Sabadell received for each of the 27 indicators in respect to the recycling of wastewater.
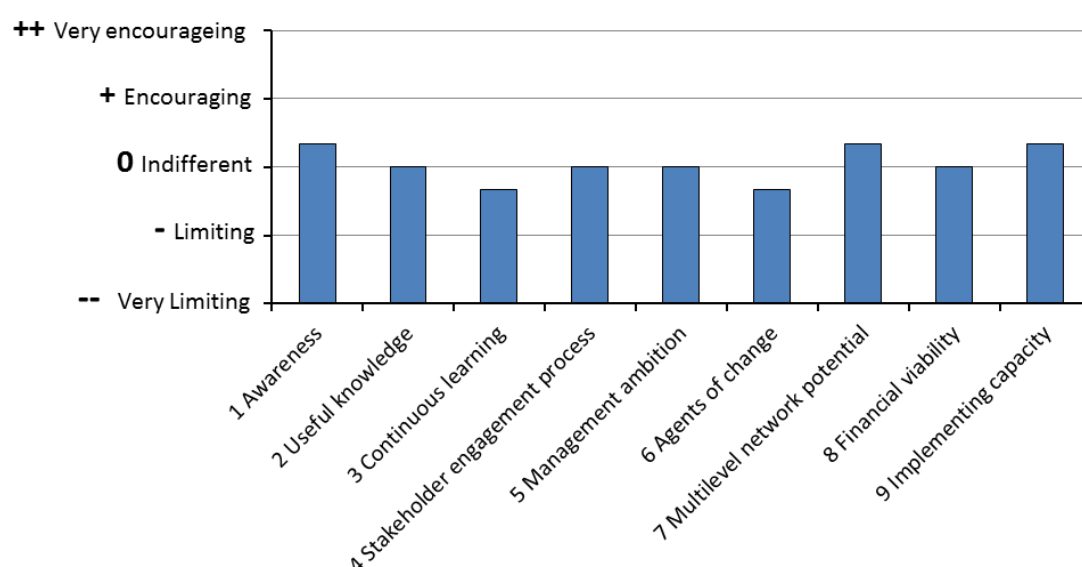
Figure 11 Governance Capacity of Sabadell, by each condition. Each condition is the average of the corresponding three indicators, as seen in Figure 10, with respect to the recycling of wastewater

Condition 1: Awareness

The understanding that the community and local stakeholders have of the causes, impacts and scale of the water challenge (indicator 1.1), has been found to be indifferent (0), neither limiting nor encouraging the governance capacity. There is adequate awareness of the fact that the region experiences a significant water stress and that climate change will increasingly amplify this water stress (S.GC:15). Because the city is very dependent on the nearby water reservoirs, people are also well-informed and knowledgeable of the reservoir status and functioning (S.GC:14). Nonetheless, there is almost no understanding on what people pay for in their water bill (S.GC:10), how the water is used and distributed within the region, the linkages and interdependencies within the water cycle and other environmental processes. The impacts on the water quality of rivers, groundwater, and the risks and uncertainties associated with the increasing water scarcity are largely underestimated (S.GC:13; S.GC:15; S.GC:2; S.GC:11 and S.GC:16). The Standard Eurobarometer Poll, which consist of over 1000 face to face interviews shows that 80% of the national population believes that they are not informed of water-related issues (European Commission, 2012). The general sense of urgency of the water challenge is low (S.GC:1 and S.GC:11), with only 68% of the national population indicating that water-related problems are a serious concern (European Commission, 2012). More specifically, the understanding of the possibilities of water recycling as a potential solution and mitigation strategy for the increasing water stress is relatively low (S.GC:12 and S.GC:4). Most citizens simply have other priorities, and they assume the responsibility to deal with this concern on the administrative bodies, such as the Catalan Water Agency (ACA), the city council of Sabadell and the water supplier CASSA (S.GC:15; S.GC:2; S.GC:12 and S.GC:9). Hence, there is only moderate willingness for incremental adaptations to reduce water stress which is reflected in local sense of urgency (indicator 1.2), which is indifferent (0), not encouraging or limiting the overall governance capacity to implement a wider application of wastewater recycling.

Despite the relatively limited level of community knowledge and local sense of urgency, it has been found that the behavioural internalisation of water conservation is encouraging (+). This can be easily demonstrated with the city's per capita consumption of around 96L/person/day - which is amongst the lowest city water consumptions in Europe (S.GC:11; SR006 and Aigües Sabadell, 2016). Interestingly however, this is not due to the depth of knowledge regarding the water challenge or a sense of urgency. Rather, it is mostly due to the historical experience or collective memory of strong droughts in the city and the region as a whole (S.GC:5; S.GC:10; S.GC:8; S.GC:11; S.GC:14; S.GC:12 and S.GC:16). On a small household scale, individual efforts are often being made to save and reuse domestic water. An example is the reuse of excess showering water that is wasted during the heating. This water is reused for different applications such as flushing the toilet or watering plants (S.GC:1; S.GC:2 and S.GC:4). One interviewee from the Provincial Government of Barcelona mentioned that although there is a good internalisation on the quantity of water consumed, there is little in terms of water quality measures (S.GC:9). For example, people dispose trash in the toilets that strongly contaminates the waters and causes difficulties at the treatment plants.

At the level of local companies such as CASSA, behavioural internalisation can be seen in some aspects; however, it is lacking in others. For instance, the company has dedicated positions for the issues of water recycling as well as sustainability in general. There is a strong effort for the expansion of the dual water network of water recycling, there are water saving toilet systems and recycled water is used for cleaning of some facilities. Non-revenue water which includes leakages and volume measurement errors amounts to 18.46%. This amount is in the range of efficiency technically accepted, but in coherence with the water saving efforts by recycling, the planned investments for refurbishing the pipelines has to increase. On the larger governance level, regional as well as national, water recycling is still very poorly embedded as a water conservation strategy. This is due to its recent emergence as a viable option. However, it can be expected that it will become more common in the coming years, due to the rapid rise of the matter in public communication (Erviti and León, 2017).

Condition 2: Useful Knowledge

The condition useful knowledge is found to limit the overall governance capacity, with scores between limiting and indifferent, although the opinion on the availability, transparency and cohesion of the information varies very much between stakeholders. The indicator "information availability" is scored as indifferent (0), neither limiting nor encouraging the governance capacity. In general, information availability is limited to the public with limited entry points. There is consensus that the regional meteorological data and information regarding the reservoir statuses published by the ACA and the regional administration is abundant though not always understandable to the general public (S.GC:11; S.GC:14 and S.GC:9). Much of the accessible information is broad, intelligible, not fully reliable and sector specific (S.GC:4; S.GC:10; S.GC:14; S.GC:12; S.GC:4; S.GC:7 and S.GC:16). However, on the local level, strong efforts have been made to improve this information accessibility. In particularly, the water supplier CASSA has developed numerous ways to make information accessible to the public. This is exemplified by their Annual Memory document, tips on the back of the water bills, education programmes targeting three gradual stages of the youth and conferences for the general public (S.GC:1 and S.GC:2). EDUCASSA is a programme where schools participate in different activities about the water cycle, which is organised by CASSA. The programme is developed for pupils between 3-14 years old. In addition to this, scholars from 12 till 14 years old visit, amongst other things, a water treatment plant (see D3.4 for more information on EDUCASSA). Moreover, annual conferences are organised (Aigua I Món' Annual Conference Cycles) with key speakers on water-related subjects. Information transparency is also found to be indifferent (0), neither limit nor encourage the overall governance capacity. The water sector in Spain can be characterised as being competitive, and economic as well as political interests often lead to low availability and transparency of publicly available information (S.GC:10; S.GC:11; S.GC:14; S.GC:12; S.GC:7 and S.GC:16). Most information that is publicly provided by the private sector is often technical-oriented information, which is difficult to understand for non-experts (S.GC:3 and S.GC:16). Because the public sector does not compete in the market, they are in general less reluctant to share their data (S.GC:12). However, it is found that they too often only share technical information whereas administrative, organisational and financial details are not publicly available (S.GC:16). As a result of this limited transparency and the often insufficient lack of knowledge cohesion between sectors, this condition is scored as indifferent (0).

Condition 3: Continuous Learning

Continuous learning is found to be one of the most limiting conditions. The monitoring of water quality and quantity in water recycling systems is very sector dependent (S.GC:15) and there seems to be a clear division between the monitoring processes and evaluation quality of the public and the private sectors. In the private sector, internal monitoring is done relatively effectively since the competitive interest of the company is strong (S.GC:11 and S.GC:16). For example, the local water supplier CASSA has a sophisticated monitoring system with which it can rapidly recognise alarming situations, and to some extent it is also able to recognise long-term patterns of consumption, water flows and water quality (S.GC:1; S.GC:13 and S.GC:12). Furthermore, there is a strong follow up of the interaction with clients as well as the flows supplied across the city (S.GC:2). Nonetheless, a more regional, national or cross-sectorial monitoring and evaluation of the water sector is lacking (S.GC:11 and S.GC:14), which results in a fragmented learning process (S.GC:16). According to one interviewee, an important reason for this is the lack of transparency and sharing of information between the stakeholders (S.GC:7; see also condition 2). Hence, balancing the discrepancy between adequate local monitoring and poor monitoring coordination on the regional and national, the overall indicator score is determined to be indifferent (0).

Evaluation of policy and implementations is found to be limiting (-), since it occurs barely on a decadal basis (S.GC:8), it is non-directional, and often politically charged (S.GC:13). The normative framework is rigid, in particular to the environmental aspects, water distribution and administrative aspects. It is difficult to adjust or even make new laws, which seems to be the result of two phenomena: 1) the rigid structures and lengthy procedures to obtain ACA's permits and 2) a change in law is a lengthy process that requires the consensus

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

of many stakeholders with different sometimes conflicting interests and viewpoints (S.GC:8). As a consequence, many outdated and inappropriate norms are still implemented (S.GC:5; S.GC:11 and S.GC:12). For example, despite the higher quality standards of treated secondary wastewater compared to other water sources, it is still prohibited to use treated secondary wastewater for agricultural irrigation or drinking water purposes (S.GC:1). Nonetheless, there is a clear effort to combat this inflexibility on the local level. Sabadell recently adopted a legislative norm that obliges all new buildings to implement a water efficiency system (i.e. use of pluvial water or reuse of grey water or connection to the non-potable public pipeline).

Finally, cross-stakeholder learning is scored as indifferent (0). Social relations are adequate between conventional stakeholders, but overall still needs to be improved (S.GC:9; S.GC:5 and S.GC:7). It has been found that learning between stakeholders occurs on the technical level, and often only for specific issues. Moreover, it is not very common that cross-stakeholder learning takes place on the political, administrative or financial level (S.GC:12 and S.GC:5). As a result of the sector's competitiveness, private stakeholders are reluctant to share information, and thus the learning process is overly dependent on a strong alignment of interests and level of trust between the stakeholders (S.GC:3; S.GC:9; S.GC:8 and S.GC:11). There is often little communication between the stakeholders in regards to their goals and thus their individualistic interests lead to isolated (in silo) actions (S.GC:16). On a regional level the community organisation Amigos del Agua tried to connect the different stakeholders within the water sector with the purpose of aligning interests. On a local level, CASSA has established learning relationships with the consumers and innovative stakeholders such as schools, newspapers and twitter and by implementing a DSP for sharing of information (S.GC:2). The local utility has a professional relationship with the City Council but it has a minimal relationship with ACA because the only the city council communicates with ACA (S.GC:12). Furthermore, the different point of view over the model of management of the water service; the City Council is in favour of a public management approach, and CASSA is in favour of a private management approach. These contradicting approaches results in some difficulties, for example in determining the water prices. Nevertheless, overall the collaboration between CASSA and the City Council is constructive. For example, both CASSA and the City Council jointly apply for various projects.

Condition 4: Stakeholder Engagement Process

On the regional scale it has been found that few and mostly conventional stakeholders are included in decision making process which ultimately is unilateral and dominated by the ACA (S.GC:5; S.GC:10; S.GC:11; S.GC:2; S.GC:12; S.GC:7 and S.GC:4). The stakeholders, including academia for instance, have only informative or consultative involvement (S.GC:5; S.GC:15; S.GC:13 and S.GC:12). There seems to be a top-down decision-making process that determines the norms, which is generally not transparent at the local level. The consumers or citizens have little active involvement or participation although there are efforts to maintain them well informed (S.GC:10 and S.GC:1). This however might reflect a lack of coherency in the overly technical decision-making process rather that a limitation of the citizen. It is important to note that this aspect is recently improving significantly, and new collaborations for involvement are appearing, such as ecological/green activist groups or basin associations (e.g. Tordera River Basin Association and Amigos del Agua civic organisation). Thus, the indicator of "stakeholder inclusiveness" is assessed as indifferent (0). In terms of protection of core values (see Deliverable 4.7), all rights are respected. However, decisions are made by weighing the stakeholder's interests unequally and top-down political interests are in many cases decisive or influential (S.GC:8; S.GC:15; S.GC:14; S.GC:11; S.GC:13; S.GC:7 and S.GC:9). Furthermore, there is a clear divide between on the one hand the regional and national policy and the local authorities on the other hand. The national and regional top-down decision-making process often limits the protection of local interest (S.GC:2). Hence the protection of core values lacks improvement, and is a limiting indicator (-) to the overall governance capacity. Progress and variety of options are also limited. On a municipal level the stakeholders' core values are better protected nonetheless. The Ethical Code of Behaviour of CASSA protects all actors involved in the company's services and there is an external chief compliance officer that overlooks this. Furthermore, a figure of arbitration is appointed on behalf of AGBAR who acts as an independent facilitator

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

between CASSA and the consumers for the scenario that any conflict or discontent on either side arises (S.GC:2).

Condition 5: Policy Ambition

The ambitions within existing policy concerning water conservation are relatively moderate whereas the statutory compliance to this policy is also not optimal. Furthermore, the aims are fragmented across the different governance levels and in particular on a national and provincial level aims are generally low in ambition (S.GC:10; S.GC:15 and S.GC:3). For example, some stakeholders expressed that aims and compliance of the water sector is high since the main goal of the sector is providing drinking water to all citizens and this has been achieved at all times. On the municipal level ambitions for water reuse are higher, since Sabadell aims to be one of the leading pilot cities of water recycling in Europe (S.GC:1; S.GC:13 and IEEE, 2017). Nonetheless, political disagreement on the urgency of the matter remains a hindering factor (S.GC:10; S.GC:7 and S.GC:3). Thus the indicator "ambitious and realistic goals" was scored as encouraging (+). Water recycling is not yet well embedded into the political (S.GC:12; S.GC:16 and S.GC:4) and normative context however (S.GC:1 and S.GC:16), being an indifferent indicator to the overall governance capacity (0). As a result, the policy cohesion is low also being an indifferent indicator (0). The norms are still largely influenced by isolated interests, and there is a lack of sectorial, geographic and administrative alignment. This could be seen in various examples. A national, sanitation-focused law that requires a minimal water flow in the taps often fully clashed with regional environmental laws of maximum water flow in taps. Some urban space permits are often released even though they go against environmental efforts and restrictions for potential flood damage prevention (S.GC:8). Low water fees for agricultural purposes that aim to assist farmers contradict the efforts to lower the agricultural sector's water consumption. A progressive tax placed on the consumption of water very efficiently discourages high consumption patterns, nonetheless from the same market-oriented point of view it discourages water suppliers from enforcing low consumption since they receive a marginally smaller income and there is no reward for them. In conclusion, there is an overall discrepancy between the national laws and local contexts. Often the national laws are not well applied to the municipal administrative and geographic context (S.GC:14; S.GC:7; S.GC:16 and S.GC:9), leading to inefficiencies and barriers in implementation (S.GC:13).

Condition 6: Agents of Change

Agents of change are found to be quite a limiting condition of governance capacity. Despite the prosperous economy of Catalonia, there is very little room for entrepreneurial activity in the water sector, receiving a score of limiting (-). Water is ultimately publicly administrated. Even when subcontracted by a private company such as CASSA, the services are provided by powerful monopolistic clusters and thus the sector is largely inaccessible for the entrepreneurs (S.GC:8; S.GC:12; S .GC:7 and S.GC:9). The ACA legislation and mandate does not prohibit or intends to discourage entrepreneurial activity. However, entrepreneurs are not facilitated it in any way (S.GC:1). There is some sector specific space, particularly in the technical/technological innovation area (S.GC:13; S.GC:11 and S.GC:16). However, in most cases entrepreneurs who enter the market would have to collaborate with a larger, already established stakeholder such as CASSA in order to start an enterprise or new initiative (S.GC:1). This lack of entrepreneurial involvement in the sector has led to an accumulation of expertise, currently deployed in research centres such as EURECAT, formerly known as CTM Manresa (S.GC:2) and has also led to the decision of many entrepreneurs to export their goods and services abroad to geographical areas such as Latin America (S.GC:9).

It has been found that overall the conventional, closed collaborations between the main stakeholders are well established (S.GC:14 and S.GC:3). However, innovative collaborations are only recently arising and are still weak. For example, CASSA collaborated with the City Council and ACA in order to make educational videos regarding water treatment and household wastewater disposal. The aim of these videos was to improve the knowledge that people have of the management of wastewater and to inform them on what they can and cannot dispose in their toilets. Nevertheless, these types of collaborations are often short term

and established for very specific issues/events (S.GC:1 and S.GC:16). Thus, the indicator "collaborative" is an indifferent factor (0) to the overall governance capacity. A frequent inhibitor of the establishment of collaborations is the divergent interests of the different stakeholders, which - as a result of insufficient communication - are very individualistic (S.GC:16). CASSA uses educational programmes to inform the community, obtain feedback of their services and to incorporate the citizens in the decision-making process by informing them. However, it is unclear to what extend they collaborate on a technical and administrative level. The only example that could be found is the implementation of tap water oxygenating accessories that were placed on household taps. These devices oxygenate the outpouring water and consequently reduce the flow of water pouring out (S.GC:12).

Finally, it is found that on the national, regional and community scale, a unifying long-term vision or strategy which transcends the political turns of 4 years, is very much lacking, being an indifferent indicator (0) (S.GC:14 and S.GC:13). However, individual and private movements and efforts that push forward sustainable water management innovations are rising. On the municipal level, Sabadell is aiming to be one of these, and the city itself has been quite successful in advancing on their own. National and regional policy, administrative procedures and short-term political cycles however still limit their ability to move smoothly beyond the business as usual practices.

Condition 7: Multi-level Network Potential

The city of Sabadell has a complex but promising multilevel network potential. Overall, the stakeholders have a quite limited room to manoeuvre due to inter-organisational difficulties and the strict regulations and procedural demands of the ACA (S.GC:11 and S.GC:7). In particular, when the activity concerns to the use or distribution of water, implementation is very difficult. The actors "must stick to their defined tasks and roles" (S.GC:11 and S.GC:3). Nonetheless, a distinction could be observed between the private and public entities; public management implies more rigid structures and procedures, while at the conventional private management level there is more room and independence to decide strategies and to experiment (S.GC:10; S.GC:1 and S.GC:13). Private companies can use this internally to manoeuvre on the technical, operational and financial scope (S.GC:14; S.GC:16 and S.GC:9). In the case of the water supplier CASSA, this is further supported by the fact that their contract with the city council for a 100 year duration, giving them security on their position. Municipalities are also quite independent but have somewhat less room to manoeuvre because they are directly constrained by the public administration. Overall, the indicator "room to manoeuvre" received an encouraging score (+).

The division of responsibilities in Sabadell is clear however too rigid, leading to inefficiencies (S.GC:5; S.GC:8; S.GC:15; S.GC:11; S.GC:11; S.GC:14; S.GC:12 and S.GC:7). The management of water in each municipality is ultimately the responsibility of each city council, with ACA and the Catalan government merely inspecting that municipalities comply with the legislation. This leads to divergent and sometimes even conflicting approaches (S.GC:9). Furthermore, some interviewees explained that responsibilities are clear on paper/contracts, however when implemented there appears to be overlap and gaps (S.GC:10; S.GC:13 and S.GC:16). The indicator "clear division of responsibilities" is thus indifferent (0) to the overall governance capacity of Sabadell. The gaps are seen for example in the financial responsibilities. Sometimes it is not clear how extraordinary investments that are necessary for innovations and infrastructural upgrades can be financed. Such investments may lead to substantial increase in water tariffs. Hence, alternative financial structures may be necessary. However, such alternative financial structures are not necessarily in the mindset of other stakeholders, be it the regional or national authorities, or private stakeholders (S.GC:14). In addition, there is limited trust between the actors in the compliance of their responsibilities (S.GC:8) which can be explained by two phenomena. Firstly there is a lack of trust in regional and national politics (S.GC:13). Secondly, during the years 2009 - 2012 ACA experienced a crisis and many of the agency's responsibilities dispersed and fell into the hands of the municipalities, since they were simply not being met (S.GC:10 and S.GC:7).

ACA's authority is dominant and strong (S.GC:8; S.GC:15 and S.GC:11). ACA's mandates are therefore highly obeyed (S.GC:16). However, some argue that the agency does not comply to their basic function of managing the water sector. ACA's procedural demands may hinder progress of the water sector, and procedures sometimes resonate political interests (S.GC:15; S.GC:1 and S.GC:7). Some interviewees further believe they are still limited by organisational, political and financial uncertainty (S.GC:14). Partly as a result of this, the region of Catalonian lacks a clear centralised leadership within the water sector (S.GC:10 and S.GC:11), and the indicator "authority" received a score of indifferent (0). This is also reflected in the not cohesive knowledge, policy and efforts for the implementation of water conservation strategies such as wastewater recycling. An interesting view of ACA's rigidness has been discussed with an interviewee from the Catalan Water Agency itself. This person explained that although there is widespread criticism on the agency's strict and even hindering function, this character of theirs is not necessarily bad - rather it is part of their job as a "judge". There are numerous stakeholders wanting to get their hands-on water, and ACA must act as the superior arbitrary that balances out the actors interests (S.GC:8). As a result, many are unhappy with their strict mandate. This however does not explain their lack of efforts in promoting water recycling methods. It seems that ACA has the potential and power, and it is in the position to unify the dispersed municipalities with the purpose of efficiently tackling the water challenge and implementing sustainable approaches. It is a responsibility they have pushed aside but must take upon themselves.

Condition 8: Financial Viability

The indicator "affordability" has been found to have an indifferent (0) impact on the water governance of Sabadell. Basic water services are accessible to everyone - they are either affordable or there are funds that support the most marginalised communities. As determined by law, CASSA uses these funds to cover the costs of those citizens who have been approved as eligible for aid by national government (S.GC:15 and S.GC:1). The price of the tap water is a progressive tariff, alleviating those who do not use much of it (S.GC:11). Furthermore, the price of the tap water has recently been frozen. Although recycled water is cheaper than normal water and thus should be affordable to the citizen, only a limited number of persons that live or work in the specific areas that have a dual distribution network can consume this cheaper water (S.GC:1). In order to use this water, the household or factory must have two differentiated pipelines; a drinking water pipeline and a regenerated water pipeline. This pre-condition could be a strong limitation for the use of this water, mainly in old buildings. It is important to add, that although the citizens are willing to pay for the basic services, only very few would be willing to sacrifice more for improvements in the water sector such as infrastructural reconstructions for the dual networks (S.GC:15; S.GC:1 and S.GC:12). Many believe that this burden should not fall on them, and it is the administration's and CASSA's responsibility (S.GC:2). Thus, consumer willingness to pay is an indifferent (0) indicator.

The financial resources for water recycling implementation and their continuation are found to be very diverse among stakeholders and governance layers. On the National, Catalan, Provincial and municipal levels the continuation of funds for any climate change adaptation - including water recycling - is largely dependent on the current fluctuating political ideology (S.GC:5; S.GC:14 and S.GC:12). For instance, in 2009 Europe's largest desalination plant was built in the outskirts of Barcelona, with an EU funding €150m of the project's €230m total cost (Water-Technology, 2017). This plant was built with the aim of reducing the pressures exerted on the region's water resources and ensuring continuation of the water supply if water reservoirs are below their critical levels. Large investments in such back-up systems may be necessary. However, in part the reuse of treated wastewater can strongly reduce the necessity of investments in large desalination capacities in times of severe water stress. As such, its activity is on "standby", and it is maintained at only about 20% at the moment. Financial continuation is thus an indifferent indicator (0). Some income is secured with the water taxes on both national and Catalan level (S.GC:16). CASSA, as part of AGBAR, has good resources and they receive a solid and continuous input of funds from the water tariffs (S.GC:1; S.GC:11 and S.GC:12). At times the city council has been low on funds and there is very little regional or state funding

which has hindered some of CASSA's aspirations of renovating urban infrastructure and extending the dual network (S.GC:1 and S.GC:13). This emphasises the question regarding financial responsibilities beyond water tariffs only since the water price need to remain affordable. Such additional funding might be in the interest of many stakeholders since the current rate of water leakages substantially amplifies water stress which in turn can affects various sectors and economic activities in the region (S.GC:9; S.GC:13).

Condition 9: Implementing Capacity

Implementing capacity has been found to be a slightly encouraging factor for the water governance of Sabadell. Some major policy instruments, such as the progressive tax on water consumption or a connection tax for new water distributions are being used effectively to incentivise low water consumptions, and thus "policy instruments" is an encouraging (+) indicator. Furthermore, statutory compliance is generally respected and found to be an indifferent (0) indicator (S.GC:11; S.GC:8; S.GC:11; S.GC:2; S.GC:7 and S.GC:9). However, because many policies are not well aligned between sectors, or are even contradicting, implementation can be complex (S.GC:11; S.GC:2 and S.GC:16). At times, policy instruments are rather political instruments, since politicians use them as a bargaining and popularity tool (S.GC:14). An example of this is the recent freezing of the water tax, or the lack of a wastewater fee (S.GC:13 and S.GC:04) - these look like a socially "kind" move. However, they have led to a loss of financial resources for the water sector that is likely to result in more costs for the tax payers in the long run.

Finally, there is low awareness of preparation strategies for Sabadell for the upcoming climate change related water stress. Given that the water reservoirs are filled to ensure supply for the region for the next two years, the issue of increasing water stress has been put aside (S.GC:5; S.GC:14 and S.GC:4). There is limited anticipation and focus on the necessary preparations/adaptations, and some interviewees have expressed that the region is blindly hoping the environment will resolve its issues naturally (S.GC:3). The low organisational capacity, poor infrastructure, limited freshwater resources and their alternatives will limit the long-term ability of Catalonia to mitigate and adapt to the upcoming water stress. This makes them very vulnerable to water stress (S.GC:3; S.GC:15 and S.GC:2). In the worst-case scenario of water shortages the metropolitan region can rely on the desalination plants, which although very expensive, could provide almost all basic necessities (S.GC:10 and S.GC:8). In regards to floods, some have said that there is only so much that a city can prepare for; some things will have to be mitigated once they arise (S.GC:16). This argument nonetheless undermines the importance of an integrative and holistic solution to the struggles in implementing water recycling schemes. Furthermore, it illustrates that Sabadell is being merely reactive to the rising issue.

On a positive note, there is good understanding of the reservoir behaviours and a lot of experience from the past that will help in the region mitigation to drought events. Water recycling is becoming more and more recognised as a promising adaptation method and cities like Sabadell are making key advancements in its implementation. Sabadell has a promising long-term goal and the city has shown good responding capacity in previous times of stress. Thus, overall the indicator "preparedness" is found to be an indifferent indicator to the governance capacity of the city.

Concluding remarks on the governance capacity of Sabadell

The overall governance capacity of the city was found to be just below slightly limiting. The results show that the multi-level governance system is complex and that the reuse of treated wastewater for non-potable purposes is progressive but not yet widely adopted in the centralised water governance system in the region of Catalonia and Spain as a country. There are several components that limit the capacity to govern practices of water recycling in the city of Sabadell. Existing national and regional norms and regulations regarding water quality or the water's source limit the application of treated wastewater for non-potable purposes. In particular, the evaluation of policy, norms, and implementations processes are strongly centralised, rigid and

limit the capacity to put new strategies into practice and find new solutions to combat water scarcity at the local level. Existing evaluation of water recycling practices are mostly irregular, fragmented, and impede the development of a cohesive legislative, institutional and management framework to support water recycling. This incoherence also hampers the freedom for entrepreneurs and other unconventional actors to enter the local network of organisations that are involved in the recycling of treated wastewater.

At the local scale, the city of Sabadell is ambitious to address this issue and has adopted realistic policies and implementation schemes. There is a long-term continuance in the local division of responsibilities between the service provider CASSA, the city council, and the water consumers. As a consequence, there is considerable room to manoeuvre and explore, test and evaluate new concepts, ideas and solutions to combat water scarcity at the municipal level. Although cross stakeholder learning and collaboration can be improved considerably - in particular between the city council and CASSA – the use of policy instruments such as a progressive tax system for water consumption has resulted in the internalisation of water conservation behaviour amongst the local water consumers.

5.2   Sabadell's experiences with collaborative learning

In the following section, specific aspects of collaborative learning are analysed with regards to reusing treated wastewater in Sabadell. In this analysis, experiences with collaborative learning in Sabadell are examined.

Learning Products

There are two types of learning products, namely cognitive and behavioural changes. The learning products that are found in Sabadell are discussed in this section.

There is an overall sense of awareness about water scarcity in Sabadell. This is a good prerequisite to implement a water recycling scheme in the city. In addition to general awareness on water scarcity, water governance is being perceived as an important topic in the political arena. It is a relevant part in the local political debate in the municipality of Sabadell and in neighbour municipalities within the river basins of Llobregat and Besòs rivers. Most interviewees expressed concern on the topic of water, and there is a general feeling of awareness on the importance that water plays in the political arena. This importance is based on its scarcity, and the controversy on water management which is caused by another ongoing debate on public-private division of responsibilities regarding water supply services.

In the river basins of Besòs and Llobregat people are especially aware of water scarcity due to the 2007-2009 drought. During these years there was a big drought in Catalonia which led to the declaration of emergency. Furthermore, it was a tipping point for society to gain awareness on the vulnerability of the urban areas located in these river basins. This in turn led to a reduction in the water consumption per person. Since this big drought, the freshwater consumption per person was significantly reduced from 123 litres to 98 litres per person. After 2009, the water consumption per person did not increase as people remained aware of water scarcity in the river basin of Besòs. In Sant Pau de Riu Sec, the Non-Potable Recycled water (NPR) scheme was successful. The public accepted the project as it was perceived as a solution to the issue of water scarcity. The project also established an open communication between business owners and the water supplier (CASSA), which allowed the company to predict and address all the underlying issues in the industrial park.

Learning Processes

In this section the learning process are examined, which includes the process of acquiring, translating and disseminating information (Heikkila & Gerlak, 2013).

The municipality of Sabadell has adopted a leading role to implement and upscale the NPR scheme. The Water Masterplan of 2014 gives guidance on how the NPR scheme should be implemented. Therefore, if stakeholders want to acquire information on wastewater recycling, the municipality offers a wide variety of information on their website and in the Masterplan. This information is publicly available and transparently communicated to the general public. Furthermore, the municipality is actively supervising how the local water supplier CASSA is expanding the NPR network throughout the city. The water company can thus also acquire information and receive support from the municipality. To reduce water consumption from the general public during the last drought that affected the city of Sabadell from April 2007 until January 2009, all institutions involved in water management performed an ambitious (educational) campaign (Vinyoles & Quirante, 2010).

Institutional Structure

In the following section the institutional structure is discussed. Collaborative contexts can differ extensively based on who participates in the collective, what roles different actors play, and how those roles are structured. Therefore, in this section the roles and responsibilities of different actors in Sabadell are examined (Heikkila & Gerlak, 2013).

Since 2002, the municipality of Sabadell has been working to include the use of non-potable water in its water supply system. In 2002, the municipality recovered the 'Mina de Ribatallada' well as a pilot project to use non-potable groundwater to water city gardens or to clean streets (Ajuntament de Sabadell, 2016). Since the recovering of this well, the municipality expanded the use of non-potable water with the objective of reducing the dependency on freshwater resources. In 2004, the municipality approved a masterplan for the use of non-potable water (Pla Director d'Utilitzacions Externes a la Xarxa de Distribució d'Aigua Potable 2004). This masterplan has the aim to create two separate water networks to permit the reuse of recycled water for all purposes that require a less stringent quality (Ajuntament de Sabadell & Aigües de Sabadell, 2017). Since the approval of this masterplan, the ambitions of the municipality of Sabadell increased regarding the use of non-potable water (Vinyoles et al., 2015). In 2013, Sabadell included non-drinkable water public services in its local domestic water supply regulations and in 2014, the Non-Potable Water Masterplan of Sabadell was updated (Ajuntament de Sabadell & Aigües de Sabadell, 2017). The objective of the Non-Potable Water Masterplan is to promote the use of recycled water instead of freshwater for secondary uses as irrigation of green zones, industrial and domestic purposes as toilet flushing, and, in the case of groundwater, for public swimming pools. This substitution aims to reduce the freshwater consumption and to ensure water availability for certain uses, especially in case of drought (Ajuntament de Sabadell & Aigües de Sabadell, 2017).

Social Dynamics

In the following section the social dynamics within and between actors involved in the NPR scheme are discussed. Social dynamics can play a key role in promoting and obstructing collaborative learning, and includes variables such as inter-personal trust, open communication and leadership (Heikkila & Gerlak, 2013).

All institutions involved in the water governance landscape of Sabadell are positively cooperating to draw consistent policies and regulations to promote the successful upscaling of the NPR scheme in the city. This cooperation is especially positive at the local level, where all the relevant water-related institutions are actively cooperating to design and to implement the scheme planned in the Water masterplan (S.CL:11; S.CL:13 and S.CL:14). Most of the efforts to implement the NPR scheme come from the local authorities, while national, regional and river basin authorities play a smaller role by lowering taxes for water users who would use recycled water or by explaining this system at a regional level to incentivise a replication of the NPR scheme to neighbouring municipalities (S.CL:4; S.CL:13; S.CL:14 and S.CL:19). The larger handicap for the municipality of Sabadell was to overcome the strict health regulations and to convince the public health

regulator about the possibility to use recycled water in a pilot, however, these obstacles were overcome in 2015 by the establishment of a dialogue between the municipality and the Public Health Department of the Government of Catalonia that created trust between the two different institutions and it encouraged the Public health Department to authorise the use of recycled water (S.CL:1; S.CL:13; S.CL:14 and S.CL:18).

The two organisations, CASSA and the municipality of Sabadell have been successfully coordinated, and this coordination is positively contributing to implement the NPR scheme. At a local level, the municipality of Sabadell is responsible for defining objectives and for elaborating policies and strategies to achieve those objectives while CASSA implements those objectives and maintains the service. Therefore, the good coordination between CASSA and the municipality of Sabadell allowed CASSA to enforce the necessary actions to implement the NPR scheme, from the installation of a double pipeline system to extend the NPR water supply, the establishment of a close communication and follow-up in the implementation of the NPR scheme in the industrial park of Sant Pau de Riu Sec or in collaborating to develop a funding scheme to finance the expansion of the double pipeline network (S.CL:11; S.CL:13; S.CL:14 and S.CL:15). The water supply company of Sabadell, CASSA adopted a positive role, assessing the municipality to implement of an NPR scheme throughout Sabadell. From the beginning of the implementation of a non-potable water scheme in 2004, the positive relationship between the municipality of Sabadell and CASSA was good and it contributed by strengthening the leadership of the municipality (S.CL:11 and S.CL:15).

The NPR scheme was successfully implemented in Sant Pau de Riu Sec because the local government led the implementation of the regulations to promote the use of reclaimed water and it established a positive cooperation with other institutions involved in the water governance of Sabadell. The communication between business owners and CASSA was established through a representative of the industrial park who is the manager of one of its sections. This businessperson was a trusted representative of business owners in the industrial park that was in constant contact. This representative was in periodic contact with representatives of CASSA and with all the companies of Sant Pau. The reduced number of involved stakeholders and the establishment of a trusted communication system between business owners and CASSA strengthened a collective learning process and created a capacity to dialogue between stakeholders and policymakers, creating thus, a debate that allowed water users to provide feedback on the systems' performance and strengthening the governance of the recycled water system.

The communication between CASSA and water users proved to be able to address potential underlying issues and concerns caused by the implementation of the NPR scheme. One example of a potential issue that was solved through an effective dialogue between CASSA and water users was an issue caused by the colour of the recycled water. Sometimes the water recycling process would give a slightly yellow tone to the water. This colour created some initial concern as water users would associate the slightly yellow colour with it not being clean enough or with toilets not flushing correctly. The existence of the informal communication channels between CASSA and water users allowed this concern to be transmitted to CASSA, who recognised the feedback from the water users and decided to add a blue colour additive to the recycled water to solve the problem. The example of this incident with the colour of recycled water is a good example of how a good communication between water users and water managers can be an effective strategy to address underlying issues or concerns of any kind and allow non-governmental stakeholders to ament public policies.

At a river basin level, the cooperation between the local authorities and the ACA has a different dynamic. Firstly, the local government of Sabadell took the initiative and adopted a leading role and proactively work to create a good coordination between ACA and the municipality. Despite that ACA initially was not involved within the local ambition to implement an NPR scheme as it was stated in the Non-potable water masterplan, after the establishment of a dialogue and negotiations with the municipality of Sabadell, ACA became a cooperative party, authorising the use of wastewater to implement the scheme and even to collaborate with the municipality and to facilitate the necessary means to implement the NPR scheme. More specifically, ACA

authorised the municipality to use regenerated water for urban uses as water gardening and toilet flushing and in 2009, ACA upgraded the EDAR of Riu Sec, who improved the quality of treated water and made the regeneration process easier (S.CL:4; S.CL:13; S.CL:14; S.CL:18 and S.CL:19).

Technology and Functionality

In this section the technological and functional domain are discussed as it also influences how actors are organised and how they interact. It includes variables such as the capacity to process information, the adequacy of available information and the transparency of technological processes to every actor involved.

Concerning the forum for deliberation, there are up to three different initiatives from the different water-related authorities to establish an open public debate on water governance in Sabadell; the 'Taula de l'Aigua', the 'forum de l'Aigua de Sabadell' and a DSP. These three fora are relatively new and yet unknown to the interviewed water users of Sabadell; therefore, they had not been used yet by stakeholders. However, despite the diversity of initiatives to promote the creation of an open debate on water governance, none of the existing initiatives are yet well-known among the general public. All the stakeholders who want to participate in the water governance debate of Sabadell explained that they do not know where to seek for information or where to bring their concerns with regards to water management.

The municipality of Sabadell is promoting the creation of an offline public involvement project called 'Taula de l'Aigua'. The 'Taula de l'Aigua' is a public participation forum officially created in January of 2018 composed of representatives of different entities, non-governmental organisations and public local institutions. This forum aims to be a public participation space where the municipality can inform about the water-related policies that have to be implemented and people can participate in the discussion of these policies (Ajuntament de Sabadell, 2018). The initiative of 'Taula de l'Aigua' aims to fill the existing gap on public participation that the local water governance needs to generate an open debate among the citizens of Sabadell about water governance. This space only integrates local institutions and non-governmental organisations, but it does not explicitly integrate river basin organisations as the Catalan water agency, the Public Health Department of the Government of Catalonia or the water company of Sabadell that play an important role in water management (Ajuntament de Sabadell, 2018; S.CL:8 and S.CL:15).

Besides the Taula de l'Aigua, CASSA is also developing parallel initiatives to integrate public participation in their strategy and to create spaces for an open feedback to the company. CASSA created an outreach programme called 'Al costat de les persones' and started a campaign of meetings with local entities and associations of neighbours to communicate and open a space for feedback on the policies of the company (CASSA, 2017). Additionally, an offline initiative called 'Forum de l'Aigua' also aims to gather constant feedback on the management of CASSA by creating a closed dialogue between members of the board of the company and twelve stakeholders selected by the company and with diverse backgrounds (S.CL:15).

A third initiative is the POWER project aiming to create a public forum to bring more information about water management and to enable a debate on water management through the creation of the DSP, a model of public engagement through digital means (also described in section 2.1.3). As mentioned previously, the DSP consists of an online platform accessible through a website and a mobile app that hosts different water-related challenges and users have the opportunity to obtain information, to comment on a forum and to feedback the policy though an online platform that lessens the transaction costs and makes public participation more available and transparent to stakeholders.

The difference among the role of the three initiatives is not explicit and they could be competing to fulfil the same function of trying to enable a public debate without being coordinated to each other. Moreover, all the initiatives seem to not to be fully inclusive, the 'Taula de l'Aigua' does not include water-basin public

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

institutions as the Public Health Department, the ACA or the water supplier CASSA. The 'Forum de l'Aigua de Sabadell' and the outreach campaigns performed by CASSA have the potential to create a communication channel between CASSA and its customers, however, this dialogue is constrained to a limited number of organisations and it does not involve institutions as the Municipality of Sabadell or political parties. Finally, the POWER DSP lacks collaboration from a variety of stakeholders and according to some interviewees the DSP lacks of a defined strategy to coordinate itself with the existing offline public involvement projects as the 'Taula de l'Aigua' or the existing outreach and public feedback projects performed by CASSA (S.CL:8, S.CL:15, S.CL:17, S.CL:23).

Concluding remarks on collaborative learning in Sabadell

Based on the results, the NPR scheme can be implemented in Sabadell, however, the application of the NPR scheme is still vulnerable to a negative public reaction. The municipality who is leading the implementation of the project, is positively coordinated with all the other institutions related to the local water governance and a financing scheme is making capital available to invest in its infrastructure, which enable the municipality to upscale the NPR scheme throughout the city. The policy leadership fulfilled by the municipality of Sabadell demonstrated to be essential to allow the implementation of an NPR scheme in Sabadell. The policy leadership is defined as the presence of a leading institution or a political entrepreneur that promote a policy change. The positive coordination among all the governmental stakeholders related to water governance in Sabadell is of major importance to allow the implementation of the NPR.

The population of Sabadell has a general sense of awareness about the problem of water scarcity that affects the city and its surroundings. Despite this awareness, the city of Sabadell still lacks a public forum or an enabler for a public debate. There are different spaces created to allow citizens to discuss the water governance scheme in Sabadell, but these spaces have several limitations due to a lack of perception of legitimacy between stakeholders and to a fragmentation of the public debates. These limitations are possibly caused by a lack of trust between stakeholders or an insufficient coordination between them. Therefore, Sabadell needs to create an open forum that allows a genuine public influence over water-related policies. Following the advice of Russell & Hampton (2006), the open forum to create a dialogue on water governance should meet the following key points. First, this forum needs to include all the stakeholders related to the water governance of Sabadell and beyond to ensure its diversity, especially combining stakeholders with technical profiles and water management expertise. Secondly, the public participation process should be completely transparent, people should be given credible and comprehensive information through accessible means. Third, public deliberation should promote the articulation of any issue related to water governance, in the local scale but also in a river-basin scale.

5.3   Potential role of the POWER DSP in Sabadell to address water stress

Based on the governance capacity analysis and the in-depth analysis of collaborative learning provided in the previous sections, here the potential role of the DSP to strengthen the governance capacity dimensions is discussed. We focus on the first four conditions of the governance capacity framework – awareness, useful knowledge, continuous learning, strengthen stakeholder engagement – as the DSP has the most potential to strengthen these conditions. The five remaining conditions of the framework are discussed together. In the end of this section recommendations are provided on how the digital social platform can be improved in Leicester. Box 5 below, presents the key characteristics of the DSP of Sabadell. These characteristics are retrieved from other deliverables of the POWER project, including D3.4 (report on the gamification model used within POWER DSPs) and D3.5 (report on the POWER engagement model).

Box 5: Key characteristics of Sabadell's DSP

The water community of Sabadell focuses on the issue of water stress. The DSP has multiple objectives, including: (1) to increase knowledge and awareness on different water topics to promote environmental protection and responsible water consumption, including drinking water quality and reuse of non-potable water; (2) expand the existing non-potable water network according to citizens' demand and to promote its use through transparent public participation, and (3) the co-creation and co-design of topic contributions from young users on water quality and water conservation. The DSP communicates a wide variety of information to help stakeholders understand the challenge of water quality. The interface of the DSP allows users to browse information on different topics and leave feedback in the form of comments, documents or polls. Users can change the language of the platform from English to Spanish and Catalan, which makes it more accessible and intelligible for the citizens of Sabadell. Furthermore, users can share their activity through social networks, including Facebook and Twitter.

The information that is provided on Sabadell's DSP includes successful cases of efficiently manage water in Sabadell and information on water quality. There are also information pages on the non-potable network in Sabadell which is supported by information on the Master Plan (2014-2024) that has been designed and approved by the municipality of Sabadell and CASSA. Information is supported though visualisations such as maps and documents. One of these maps shows the current network of non-potable water along with its growth prediction for the coming year. To create more interaction and collect the opinions of stakeholders, users are asked to leave a comment explaining where they would like to see the actual network grow. In this way, the municipality and CASSA can design the best network for everyone, based on the demands of citizens. In addition to this, the platform communicates different offline events to the users, such as workshops and an annual conference. Furthermore, users of the DSP were able to participate in an idea contest. This is the same contest as mentioned previously in the other KDCs. Through a co-creative approach, innovative ideas are developed that effectively address sustainability issues in Sabadell. In addition to online participation, one-day workshops have been organised with the aim to learn citizens how to develop their ideas on prototypes.

The main contributor to the DSP of Sabadell is the water company CASSA. There are also information pages that explain the activities of CASSA, including information on the EDUCASSA programme. This is a programme which takes place in schools with the objective of promoting responsible water consumption. To encourage users of the platform to join in one of their activities, a form is attached where users can sign-up.

Potential of the DSP to raise awareness

There is adequate awareness of the fact that Sabadell experiences a significant water stress, nonetheless there is almost no understanding on for instance what people pay for in their water bill, how water is used and distributed within the region, and the possibilities of water recycling as a potential solution and mitigation strategy for the increasing water stress. The DSP aims to increase knowledge and awareness of stakeholders on the issue of water stress and recycling. To enable this the platform communicates a wide variety of information to make stakeholders more aware of the challenge. The DSP includes for instance a map which visualises the non-potable water network in Sabadell, and it also encourages citizens that live near these networks to contact the local water company if they want to make use of non-potable water. Furthermore, it is explained for what purposes non-potable water can be used. In the future, the DSP in Sabadell could also be used to explain what citizens pay for in their water bill. It is however positive to note that although the community knowledge and local sense of urgency is limited, the per capita consumption of water in Sabadell is among the lowest in Europe.

Potential of the DSP to increase useful knowledge

Information availability is limited to the public and the information that is available is not always understandable to the general public. The information that is provided by the private sector (e.g. water companies) is mainly technical-oriented information, which is difficult to understand by non-experts. Although the public sector is less reluctant to share information, they also mainly share technical information whereas administrative, organisational and financial details are not shared. A DSP has the potential to bring more data to all stakeholders and to share more resources between them such as information and reports. To ensure that information is comprehensible for all stakeholders, not only technical data should be shared but also information that fulfils the needs of different stakeholder groups (e.g. information on what people pay for in their water bills). To ensure that the content on the DSP is comprehensible, it is recommended for future applications to have an editorial team. This team can regularly check if the content is understandable and relevant for all stakeholder groups. This will also result in more transparency. Furthermore, the presence of a DSP to encourage public participation is a good opportunity for Sabadell due to its potential to lower some of the transaction costs implicit in the traditional offline public participation processes.

Potential of the DSP to enable continuous learning

At present, there is a lack of transparency and sharing of information between stakeholders, and it was found that learning between stakeholders in Sabadell regarding the recycling of wastewater primarily occurs on the technical level. To ensure cross-stakeholder learning takes place, the DSP can be used as a way to start a debate between different stakeholders. The focus should not only be on the technical aspects, but also on political, administrative and financial aspects. Furthermore, as described in the typologies of Mukhtarov et al. (2018), the DSP can be used in such a way that it promotes trust and legitimacy through communicating activities transparently to citizens in a spirit of information disclosure.

Potential of the DSP to strengthen stakeholder engagement

This study has observed that few and mostly conventional stakeholders are included in decision-making. The citizens have limited active involvement or participation. The DSP is a tool with the potential to create more transparency and improve communication between a variety of stakeholders. However, one issue arises when discussing stakeholder inclusiveness. The platform is namely perceived as a biased tool by some interviewees as its challenges and open debates are only provided by CASSA. According to an interview with a member of a local political party said: "*This platform only has content from CASSA, it looks like nothing but an extension of their website. We need to reframe who participates and how in this project*" (S.CL:23). However, some of the information pages have been created in collaboration with other stakeholders. For instance, the page on successful cases in the efficient management of water in Sabadell has been developed with content generated by the municipality and local businesses. Moreover, stakeholders that have

participated in different workshops (e.g. the municipality, ACA and citizens) organised by CASSA provide content or ideas that are subsequently incorporated into the DSP. To prevent fragmentation in the debate of water management it is communicated which stakeholders provide input into the challenges and debates on the DSP. In this way, the DSP can be used by a different organisation which may boost their collaborative efforts. Furthermore, it is important to establish a collaboration between the already existing public engagement projects such as the offline public involvement project 'Taula de l'Aigua'. The DSP can make use of this already existing offline collaboration between a variety of stakeholders, for instance by providing information on meetings that are planned within this project and the DSP can be used as a tool by stakeholders to easily communicate and discuss topics related to water governance in addition to the offline discussions.

Potential of the DSP to strengthen additional conditions

Innovative collaborations are only recently arising and can still be strengthened. The water supplier CASSA has recently collaborated with the city council and ACA in order to make educational videos regarding water treatment and household wastewater disposal. These types of collaboration have been often rather ad hoc and temporary in the past, but this collaboration could provide further good examples of what could be communicated on and disseminated through the DSP. These visualisations could improve the knowledge that people have of the management of wastewater, and could also result into behaviour change related to more wastewater reuse and higher public acceptance of greywater reuse. These existing collaborations should thus also be benefited by the DSP and vice versa. Accordingly, the DSP may have an important role to improve the multi-level network potential (condition 7; Table 1).

Box 6: Recommendations to ensure optimal use of Sabadell's DSP

The DSP of Sabadell is a tool for citizen engagement to address the challenge of water stress. It has high potential to raise awareness and increase knowledge of stakeholders on water recycling. To ensure the optimal use of Sabadell's DSP, we provide the following recommendations:

1. At present, the DSP of Sabadell is perceived as a biased tool by some interviewees as the challenges and open debates are mainly provided by CASSA. In this sense, a policy entrepreneurship is needed to effectively promote the creation of a public debate on water governance in Sabadell and include the DSP within this public participation mechanism. Future DSPs could involve more partners in the design and bring content to the DSP to ensure its plurality and that all stakeholders perceive it as a legitimate tool for public participation. This diversity of stakeholders should include not only all the stakeholders at a local level but also seek to include institutions at a river-basin level such as ACA, public health, the Ministry of Agriculture, researchers and experts and relevant staff from all the organisations involved in water management in Sabadell. Some information pages on Sabadell's DSP are developed in collaboration with relevant stakeholders such as the municipality of Sabadell and citizens. To create transparency, it is communicated on the DSP which stakeholders are responsible for the content. In this way, the perceived bias by some interviewees could be resolved. For example, in the challenge 'Successful Cases in the Efficient Management of Water in Sabadell' on the DSP, before each section it is communicated who wrote the text (including the name and position of the author);

2. The DSP needs to establish a collaboration with the existing public participation mechanisms as the 'Taula de l'Aigua' and the municipality itself to (1) increase its outreach, (2) to complement the 'Taula de l'Aigua' by involving more stakeholders in the debate on water governance, and (3) to avoid competing with alternative initiatives for public debates and (4) to ensure that the opinions and feedback that has been given through the DSP are influencing the decision-making process on water governance;

3. Although users of the DSP can earn points by getting informed and engaging with water challenges in Sabadell, at this moment no non-digital reward stems from collecting those points. Positive reinforcement could be fostered by giving tangible rewards when a certain number of points is collected by users as a way to increase the number of visitors on the website. CASSA has provided non-digital rewards to stakeholders for their participation in the workshops and for answering surveys about the DSP (e.g. glass bottles).

6   Water governance, learning and the potential role of a DSP in Jerusalem

This chapter presents the results of the governance analysis of Jerusalem. First of all, the capacity to govern water conservation in Jerusalem is analysed using the water Governance Capacity Framework. Building on this baseline, an in-depth case study analysis of the pre-conditions for collaborative learning follows. Finally, the potential role of the POWER DSP to address water scarcity is examined.

6.1   Jerusalem's governance capacity to address water scarcity

In this study Jerusalem's governance capacity regarding water conservation is analysed using the governance capacity framework. Water conservation refers to all activities that save water directly or indirectly. When analysing the governance capacity to conserve water, access to sufficient drinking water is assumed to be a precondition for water conservation. Accordingly, effort and activities that directly or indirectly save water while maintaining optimal service levels are investigated. In doing so, the analyses consider water conservation activities with respect to:

-    the reduction of Non-Revenue Water (NRW);
-    wastewater collection and treatment for reuse;
-    rainwater harvesting initiatives as replacement of drinking water;
-    reducing water consumption by increased use-efficiency (domestic and industrial);
-    smart drip irrigation in (community) gardens and city parks;
-    improving water quality monitoring to avoid contamination events and with that water loss.

The geographical scope of the research is the western part of the city of Jerusalem. Jerusalem is the most populated city of Israel.

In Israel, the ownership of water is entirely public and all water consumption is metered, as is set out in the foundational Water Law of 1955. The Israeli Water Authority (IWA), a national public institution, is responsible for all decision-making regarding the water supply of Israel and functions as both regulator and inspector of lower-level administrations. The water is supplied by national water supplier Mekorot. Municipalities, such as the municipality of Jerusalem, are affiliated with these national institutions as consumers of this water that provide water to their residents. The municipality transferred the responsibility for providing water to semi-private company Hagihon in 1996 and that of wastewater treatment to Hagihon's subsidiary Mavti. Table 7 shows an overview of stakeholders involved in water conservation in Jerusalem.

Table 7 Overview stakeholders related to Jerusalem's efforts to conserve water

Governance Level		Urban Water Governance Stakeholder	Societal Layer	Description of task in water governance sector
National	1	Dead Sea Drainage Authority	State	Dead Sea Drainage Authority is an independent statutory authority. It aims to protect people and infrastructure from flood damage in the Dead Sea drainage basin, which includes four municipalities: Jerusalem, Arad, Mitzpe Ramon and Tamar regional council.
	2	Israeli Government	State	A parliamentary state consisting of the legislative power in the Knesset, executive power of the government and judiciary power of the judicial branch.
	3	Israeli Water Authority (IWA)	State	The public institution and decision-maker regarding all water supply and sustainable use of water. It functions as regulator and inspector, practicing legislative and normative power. The IWA sets the national water tariff that is equal for the whole country.
	4	Mekorot	State	National water supplier in Israel.
	5	Israeli NewTech programme	State	Governmental programme that enables cooperation between local authorities and private companies in the water sector.
	6	SPNI (Societal Protection of Nature in Jerusalem)	Civil Society	National NGO with local branches that engages in environmental education and lobbies for sustainable use of resources.
Jerusalem municipal level	7	Hagihon	State/Market	The semi-private institution that buys water from Mekorot and provides it to citizens in Jerusalem. It also collects sewage and delivers it to Mavti. The municipality of Jerusalem is the main shareholder.
	8	Mavti	State/Market	Hagihon's subsidiary that is responsible for wastewater treatment in Jerusalem.
	9	City Council of Jerusalem	State	The local governing body overall responsible for the management and supply of freshwater in the city, although this responsibility is given to Hagihon that acts independently. In addition, the municipality is responsible for implementing sustainability in its policy.
	10	Sustainable Jerusalem Lobby	Civil Society	Lobby for sustainability in Jerusalem, among which water conservation.
	11	Community gardens	Civil Society	Community initiatives throughout Jerusalem that can fulfil an educational function towards the public regarding sustainability and water use.

| 12	Rainwater harvesting initiatives	Civil Society	Scattered initiatives mainly at schools as a result of educational programmes or citizens' initiative.
13	Neighbourhood Communities (Local Community Centres)	Civil Society	Aim to serve as a platform of communication for the citizens.
14	Citizens	Civil Society	Consumers of the freshwater. Pay through the water tariff.
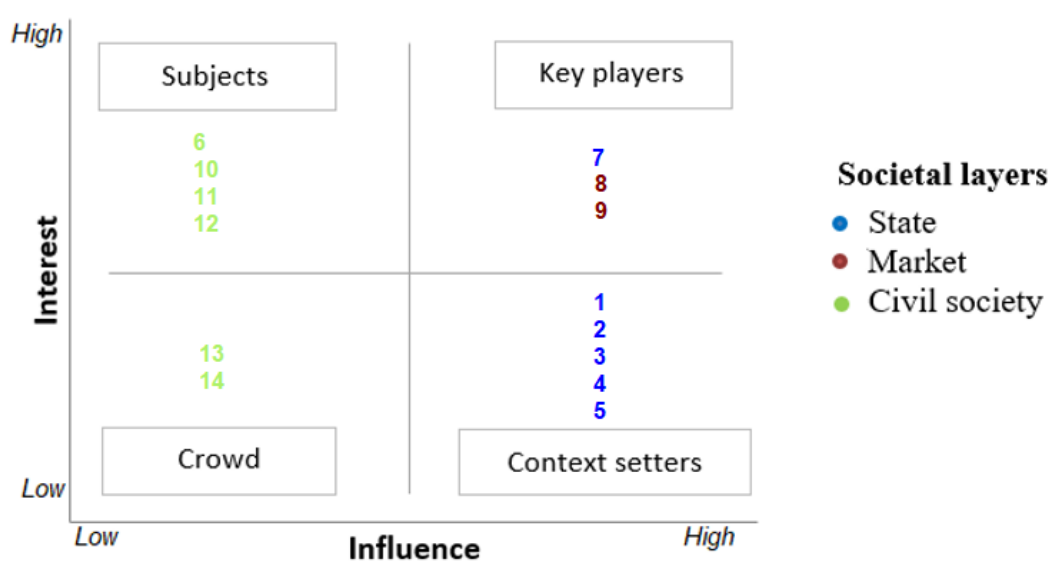
Figure 12 Analysis of the stakeholders involved in the governance of water scarcity in Jerusalem. The numbers correspond to the stakeholder numbers presented in Table 7

Jerusalem's governance capacity

Jerusalem experiences substantial water stress. In order to reduce this water stress and conserve water Jerusalem require sufficient governance capacity. Figure 14 displays Jerusalem's governance capacity regarding water conservation. This governance capacity integrates the actions of multiple private and public stakeholders relevant for water conservation in Jerusalem, thereby showing their shared ability to address the water challenge. Meanwhile, Figure 15 shows the aggregate scores for each governance condition. Subsequently, each condition is discussed more in detail using the 27 indicators.
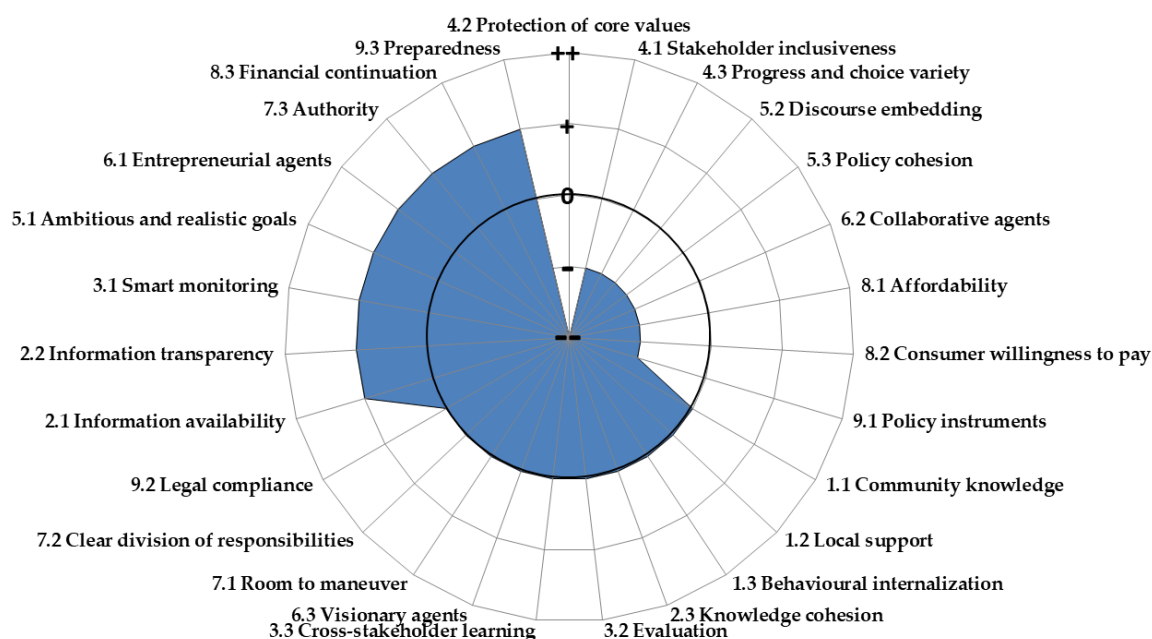
Figure 13 Governance Capacity of Jerusalem. Depicted are the scores that the city of Jerusalem received for each of the 27 indicators in respect to water conservation. They are organised clockwise around the spider web circle by most limiting (--) to most encouraging (++)
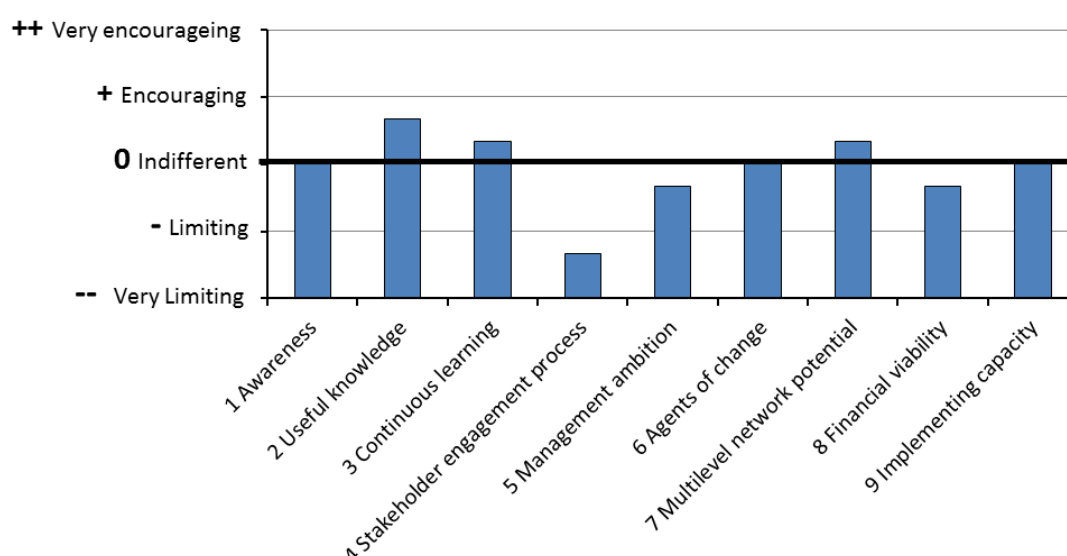
Figure 14 Governance Capacity of Jerusalem, by each condition. Each condition is the average of the corresponding three indicators, as seen in Figure 14, with respect to the conservation of water

Condition 1: Awareness

Indicator 1.1 on the community's knowledge about the current and future risks, impacts, and uncertainties of the water stress and the necessity of conserving water has been found to be indifferent (0). There is large understanding on Israel's issues regarding water scarcity and on strategies being used, such as wastewater reuse for agriculture and city parks and desalination (J.GC:15). However, awareness on water conservation as a tactic for combatting water scarcity lost relevance after the activation of the desalination plants (J.GC:10; J.GC:14; J.GC:17), which commenced in 2005 (Teschner et al., 2012). This loss of relevance is illustrated by the disappearance of national informative television commercials on saving water (J.GC:14). Nevertheless, awareness on the need for water conservation is resurging. A new national informative campaign explains how augmenting the water supply with desalination is an insufficient solution in light of the low precipitation levels and people are requested to save water (J.GC:16). With the previous campaign being during the drought in 2010 (J.GC:14), it illustrates how calls for water conservation are not an on-going priority. At the same time, knowledge on the water system is increasingly transferred to the community with the implementation of educational programmes by the local water utility Hagihon, although water conservation is not the main topic (J.GC:10). Moreover, instead of the government or water companies, NGOs, such as the Society for Protection of Nature in Israel (SPNI) predominantly disseminate information on responsible use of water in gardens by the use of drip irrigation (J.GC:14).

The local sense of urgency of actors is indifferent (0). While water scarcity is perceived as a legitimate issue, the local sense of urgency to conserve water as a solution for this scarcity is less so. The new national informational campaign on the water stress and need to save water, the first campaign since 2010, has put water conservation back into the people's mind (J.GC:14; J.GC:16). Nevertheless, this call for conserving water focuses around reducing domestic consumption instead of calling for increasing implementation of more drastic measures, such as rainwater harvesting and indoor greywater reuse. These strategies are unpopular, since people need to install and maintain the in-house systems. This means relying on their responsibility, which is a potential health risk. Therefore, the regulator IWA does not allow rainwater harvesting and indoor greywater systems (J.GC:16). Moreover, old water conservation tactics are not in place at this moment, such as the higher taxes for excessive water use, a mechanism that was in place during the drought in 2010 (J.GC:06). In addition, it was said that some people do not believe that conservation is needed because of the presence of large capacity desalination plants (J.GC:16; J.GC:17). In fact, relatively easy measures such as the appropriate use of drip irrigation systems are not well-disseminated (J.GC:14). However, there are attempts to educate people about water conservation, such as responsible drip irrigation, through organisations such as SPNI (J.GC:14). This info is shared on both their site and on that of the municipality (J.GC:14). Simultaneously, water conservation is not a topic in the municipal elections (J.GC:10; J.GC:14), rather the focus is on topics like construction (J.GC:14). Thus, the sense of urgency does not translate into a large array of practical and concrete conservation measures that extend beyond the traditional ones. Water saving options that are being implemented are limited to no-regret measures, more thorough measures do not receive sufficient public support. Also, because desalination is perceived as the long-term approach for overcoming water scarcity instead of just a back-up strategy (J.GC:15).

The level that local communities water conservation behaviour is not fully internalised (scoring indifferent (0). From the national level, some incentives are provided that move towards water conservation. First, there is a discount on water that Hagihon gets when NRW is below 8% (Water Authority, 2011). Second, the national imposed requirements to collect, treat and apply the wastewater effluent for agricultural purposes provides an incentive to reduce the water consumption. Third, the national government requires a higher consumer price for domestic water use that exceed the amount of 3.5 m^3/month/person (J.GC:6). However, these water conserving policies tend to be ambiguous and sometimes contradict each other. For instance, while the water prices for domestic use increase with the amount used, water prices for large industrial users are lower than for small users (J.GC:6). Accordingly, policies that regard water conservation are not sufficiently integrated. The separate incentives come from the national level. On the local level, water

conservation is not integrated as such into policy (J.GC:1). With respect to urban applications, water savings is hardly addressed in local policies. Although some stakeholders are calling for small calls for action, such as responsible use of the drip irrigation systems (J.GC:14). Also, there are some rules, such as that you are not supposed to irrigate your garden in the middle of the day. However, when irrigating municipal parks, the municipality does not always adhere to this rule themselves (J.GC:15).

Condition 2: Useful Knowledge

The extent to which information on water conservation is available, reliable, and based on multiple sources and methods is encouraging (+). In Israel the use of metering systems is mandatory by law (J.GC:3) (Water Authority, 2011). Consequently, Hagihon has a strong focus on monitoring the water system and applies different approaches to do so. First, Jerusalem is divided into 130 District Measurement Areas (DMAs). This division helps control NRW-loss (J.GC:8). Water metres at the edge of each DMA allow for measuring the discrepancy between the water that goes in and the water that is paid for (J.GC:2). The number of DMAs has been expanding (J.GC:8). The metering data from each DMA is send to Hagihon's SCADA-software that displays a wide variety of information: water reservoirs, levels, water pumping stations, the amount that it is pumped, which ones are working or not (J.GC:2). Subsequently, a software named 'TaKaDu' is used to monitor the raw SCADA-data algorithmically to allow for smart monitoring over time and to identify flow problems (J.GC:9; TaKaDu, n.d.). Second, Hagihon has placed around 2,000 Aquarius sensors (Aquarius Spectrum, n.d.), acoustic sensors that are placed every 200 metres (J.GC:2; J.GC:8) in 80% of the city. (J.GC:9). Each night, the sensors are activated for ten seconds and report through cellular connection (J.GC:2). When the sound pattern is disrupted this could indicate a leak. Consequently, the software of Hagihon is alerted and updated each morning (J.GC:2). It also assesses the statistical probability of a leak (Owen, 2018). An on-the-ground team is sent out to check the cause of disruption. In case of a leak, they can pinpoint this up to 20 centimetres accuracy using manual acoustic sensors (compared to five to ten metres by Aquarius; J02; J04; J08). Leaks are classified in a descending order based on severity into A, B, and C-leaks. A-leaks are fixed within three days, B-leaks within about 14 days and C-leaks only when they become B-leaks. C-leaks are not treated because it is too many checks with 80 to 100 leaks annually (J.GC:9). Private leaks are also detected through Aquarius and customers are informed of that (J.GC:2; J.GC:9). The areas covered by Aquarius experienced an 18% drop of NRW-loss (J.GC:2). The city's overall NRW-loss dropped from 12% to 9% (J.GC:8; J.GC:9). There is the intention to put Aquarius in -the remaining 20% of Jerusalem, although there are no concrete plans yet (J.GC:9). Aquarius' data is also fed into Hagihon's hourly updated Geographical Information System, which further incorporates noise-making meters, non-return, valves and blocked pipes, age and properties of the infrastructure and planned infrastructure improvement and maintenance (J.GC:9; Owen, 2018). Leaks can also be fixed non-invasively through CuraPipe through injection in the water without digging (Curapipe, n.d.), which is now a promising pilot (J.GC:2). Additionally, contamination of water is mapped and simulated in a smart Event Detection System using SCADA-data (Hagihon, 2018a). This system is aimed at providing information for decision-makers during contamination events to minimise the spread and number of people consuming contaminated water, and with that also saving water (J.GC:7).

The encouraging data availability is slightly compromised by the information transparency that is encouraging (+). The water utility Hagihon has made its site accessible in English, Arabic and Hebrew, which enhances transparency towards end-users/non-experts. There is a specific webpage on water conservation for water users, including linking to the national governmental site. However, this information is not integrated with information regarding other forms of water conservation, such as NRW-reduction. Nevertheless, annual and environmental reports are easily accessible (Hagihon, n.d.). For involved experts and non-experts within Hagihon, information is more transparent as a result of data platforms, such as the GIS-system that visualises the water grid (J.GC:9). Also, QlikView is useful to decision-makers, a tool that provides real-time information and incorporates multiple types of data, such as GIS and billing information (J.GC:3; Qlik, n.d.).

The knowledge cohesion between and within sectors is perceived as indifferent (0). Within the water sector, water policy in Jerusalem entails a Master Plan with long-term goals for 20 years combined with short-term

targets that are determined on a five-year basis as well as annually (J.GC:1; J.GC:2). The long-term goals are reviewed every seven years to update for new developments and report progress (J.GC:1). This water policy, which includes NRW-reduction as a water conserving measure, is separate from the city's sewage and treated wastewater policy (J.GC:1). The latter involves Hagihon's subsidiary Mavti that is responsible for treating wastewater for reuse (J.GC:11). Therefore, the knowledge on water conservation is still fragmented. At the same time, between sectors knowledge is integrated on a planning level, meaning that improvement of the water network is coordinated with construction in other sectors and vice versa (J.GC:1). However, this inter-sectorial coordination does not extend beyond planning, which means that other sectors do not take into account water conservation considerations. For instance, new developments by the construction sector have been destroying springs by affecting their water flow (J.GC:14; J.GC:15). Thus, the plans of other sectors, while coordinated with the water sector, might actually be counterproductive in addressing water conservation.

Condition 3: Continuous Learning

The extent to which the monitoring of process, progress, and policies is able to improve the level of learning is encouraging (+). Hagihon's use of GIS, DMAs and smart-monitoring systems, such as TaKaDu, event detection system (smart software combining information on a contamination event), has provided insights into the causes of NRW-loss (J.GC:4; J.GC:7; J.GC:9; Hagihon, 2018a). These monitoring activities enable the constructive re-evaluation of underlying assumptions that are largely determining the management of water conservation. For example, the creation of a project in 2012 where a team scrutinises DMAs with relatively high NRW-loss in order to find and address the underlying causes such as broken pipes, inadequate meters, theft and leakages (J.GC:4). The project started with two or three employees and has expanded to include six members at present (J.GC:4). The project team monitors about three DMAs annually (J.GC:4).

The degree of evaluation and improvement of current policy and implementation related to water conservation is found to be indifferent (0). Hagihon's Master Plan contains the water policy for a 20-year period. Recommendations are made based on the previous Master Plan, which identifies remaining problems (J.GC:2). Consequently, solutions can be formulated as new targets, both on the short- and long-term. The long-term targets are evaluated every seven years based on what the progress is, what implementations are ahead and which one's lack behind (J.GC:1). Also, new technologies that develop over the years are taken into consideration (J.GC:1). However, what is incorporated into the Master Plan largely depends on the national Master Plan for the water sector. That this leads to insufficient evaluation is illustrated by the plans for Jerusalem's Fifth Pipeline to secure the water supply. Implementation on the ground receives a lot of resistance but is not evaluated due to the top-down implementation. Meanwhile, Mekorot (the national party responsible) is presenting the plan as environmentally sustainable (Mekorot, n.d.), something that is disputed by residents in Jerusalem (J.GC:15). Thus, there consist discrepancies between the assumptions by national policy and implementation practices in Jerusalem.

The extent to which stakeholders are open to and have the opportunity to interact with other stakeholders is found to be indifferent (0), as stakeholders are open for stakeholder interaction but do not allocate the time, resources and effort for more in-depth cross-stakeholder learning activities such as focus groups, workshops, stakeholder engagement sessions etcetera. The national governmental NewTech programme supports the collaboration between Hagihon and private actors by providing co-financing to a maximum of approximately 360,000 euros (J.GC:16). This has led to more interaction, such as with Aquarius regarding acoustic leakage detection (J.GC:16), implying more in-depth cross-stakeholder learning. Simultaneously, the interaction with stakeholders that receive Hagihon's services, such as communities, is mostly limited to informative forms of communication. Other, more interactive cross-stakeholder learning such as stakeholder consultation or co-production of plans and policies with stakeholders, is generally not considered (J.GC:15). This is in line with the top-down approach of the Israeli water policy and is also an illustration of how stakeholders with potentially different opinions are only involved in the decision-making process in such a way that mutual learning does not necessarily occur.

Condition 4: Stakeholder Engagement Process

Indicator 4.1 refers to the extent that stakeholders are involved in the decision-making interaction, which is found to be limiting (-). There is hardly any engagement of the public during policy creation since the local water utility functions relatively independent from the municipality, which makes it less accountable to the public than city hall is (J.GC:15). No one is involved in Hagihon's decision on how to distribute the money (J.GC:02). Simultaneously, the IWA has some guidelines on how to develop policy, which are guiding for Hagihon when writing its policy independently using planning officers that are outsourcing professionals, such as private company Tahal (J.GC:1). The Water Commissioner of IWA has to approve the policy plans (J.GC:1; J.GC:2). IWA is the regulator that guides and inspects Hagihon and makes national policy and the rules. Subsequently, Hagihon has to combine its policy with national policy (J.GC:1). In other words, through the dependency on the IWA, policy creation can be perceived as a centralised top-down process. When policy is implemented, for instance improvements on the water grid, then this is communicated by informing the public through a representative at the Local Community Centres (LCCs) (J.GC:1; J.GC:15). However, most of the residents of the neighbourhood are not in contact with their LCCs or may not know of their existence (J.GC:15). Therefore, it can be said that the LCCs cannot provide a voice for local authorities (J.GC:1). The contact between Hagihon and the LCCs is facilitated through the municipality and is generally informational (J.GC:1; J.GC:15). People can express their dissatisfaction with the project and can appeal for refusal of the project through the LCC. However, it is up to Hagihon to decide how willing they are to take these demands into account, because the company already has the required licenses at this point and can decide to continue with the project regardless of public demands (J.GC:1). Some benefits have been provided for residents, such as the creation of a sports yard on the roof of a new water reservoir (J.GC:1), although the construction of the reservoir did not appear to be up for discussion. Therefore, the time-period of stakeholder engagement is limited and there is relatively low influence on the end-result.

The protection of stakeholders' core values is found to be very limiting (--). An example of this is the construction of Jerusalem's Fifth Pipeline, a collaboration with national water supplier Mekorot (EMS Mekorot Projects, n.d.) to supply desalinated water to the city (J.GC:15). There has been opposition from the population (J.GC:1; J.GC:15). The opposition realises that the project in itself is important for securing water supply in light of the country's water scarcity challenge. However, people feel that it has gone down an unsustainable route destroying precious areas (J.GC:15). People are not invited to get involved but are involving themselves (J.GC:15). For example, through demonstrations and making noises in the local media (J.GC:1). In addition, The Sustainable Jerusalem Lobby is trying to get different neighbourhoods and stakeholders to work together, so that institutions such as the IWA cannot disregard them (J.GC:15). However, Hagihon did not accept their demands and is going to construct the waterline as planned in Master plan of Hagihon's and IWA (J.GC:1). Accordingly, the Society for Protection of Nature in Israel (SPNI) is legally trying to obstruct implementation of a building project that will affect the state of the natural water sources (springs). Also because the springs function as ancient heritage and are used for religious baths. Even though SPNI is aware that they will most likely loose (J.GC:14). Involvement procedures and the variety of options considered is found to be limiting (-) the capacity to govern water conservation. The fact that policy is created at the national level through a Master Plan (IWA, 2012), leads to a top-down process where Hagihon is responsible for the implementation in Jerusalem (J.GC:1), as mentioned in indicator 4.1. This compromises the room for alternatives to be considered by alternative stakeholders.

Condition 5: Management Ambitions

The extent to which goals are ambitious and realistic is encouraging (+). The water utility has a long-term Master Plan for 20 years supported by short-term targets for five and one year(s). The monitoring of intermittent progress is therefore made easy, and the long-term goals are reviewed every seven years (J.GC:1; J.GC:2). Water conservation is not mentioned in these plans in those terms (J.GC:1). However, water conservation is a direct consequence of two main pivots of Hagihon's water policy: NRW-reduction and prevention of and fast response to water contamination. In case of wastewater treatment, Hagihon's responsibility is limited to the maintenance of the sewer networks. The purification plants are under the

responsibility of Mavti, a subsidiary of Hagihon, that treats Jerusalem's wastewater for reuse, mainly in agriculture and city parks (J.GC:11; J.GC:14; J.GC:15). Planning within Mavti seems less structured than within Hagihon. Long-time planning is only for new infrastructure, not within the existing plants themselves. The maintenance in the plant itself is made on an annual basis (J.GC:11).

From a cultural perspective, water conservation is supported due to the importance to take care of the world from the different religions represented in Jerusalem. In some cases, the religious context prevents certain water conserving measures to be implemented, such as the implementation of automated ultrasonic meters Octave (Arad, 2018) and acoustic sensors of Aquarius (Aquarius Spectrum, n.d.) both technologies decreasing NRW-loss, that are in conflict with Jewish orthodox traditions of the Shabbat when no electricity is allowed (J.GC:3; J.GC:8). However, this challenge is being partially addressed by placing the meters and sensors underground (J.GC:3).

The extent to which policy is relevant for water conservation is found to be limiting (-). The transfer of the responsibility for water supply in Jerusalem from the municipality to semi-private company Hagihon in 1996 has ensured that budget of the water sector remains in the water sector. Instead of the budget being victim to the whims of politics and their short cycles (J.GC:16). At the same time, this makes that water policy is not integrated into other policy fields and co-benefits are not adequately explored. As mentioned in condition 2 (useful knowledge), inter-sectorial coordination relates to planning. For instance, the construction of the Light Rail (tram) required Hagihon to move pipes. When this is infrastructure that is older than 40 years, such replacements can be done in a financially viable way by Hagihon. However, when relatively new infrastructure has to be replaced, the party causing this replacement has to pay (J.GC:2).

Condition 6: Agents of Change

The extent to which entrepreneurial activity is possible in the water sector in general and with respect to water conservation activities in particular is found to be encouraging (+). Although water is a public service, there is increasing acknowledgement that the way in which it is managed could benefit from collaborations with private actors. The water sector is generally perceived to be a conservative sector (J.GC:16). The governmental NewTech programme that started in 2006 tries to change the conservative character of the water sector by promoting the private sector to Israeli water utilities, especially start-ups to help them to commercialise their product. This also allows actors within Hagihon to engage in entrepreneurial activities and look for innovative opportunities (J.GC:7; J.GC:8). The programme has made public entities more open to stakeholders and made them aware of bureaucratic barriers. Consequently, public actors become more flexible to give technology, among which water saving technologies, more presence (J.GC:16). The implementation of Aquarius (Aquarius Spectrum, n.d.), acoustic sensors that detect hidden leakages, by Hagihon is an example of the results of this programme after they saw it successfully implemented in a different municipality. Hagihon started with 80 Aquarius sensors funded by the programme (J.GC:16). The increased room for entrepreneurial activity is reflected in the interest in this national programme, whereas there where three utilities in 2006 with five to eight project applications, a year ago there were 23 utilities (J.GC:16). These experiments extend beyond small-scale pilots, as is the aim to commercialise and export the products of the companies. However, the financial security of the programme covers a period of three years after which it needs to be reapproved as it is not part of the baseline governmental budget (J.GC:16). Next to that, experimental projects are realised that do not include Jerusalem's water utility Hagihon. First, rainwater harvesting initiatives are started in schools in small-scale projects for educational and water conservation purposes (J.GC:18). However, long-term support is lacking, since financial continuation is largely dependent on donors and the willingness of the schools' acting principals to continue the project (J.GC:18). Second, in community gardens the understanding for water conservation measures is present. There are small actions, such as the use of the garden's greywater from sinks for watering trees. Nevertheless, it is perceived that water projects, especially infrastructure, are difficult to fund in the long-term because they do not have sufficiently visible results in the short term (J.GC:18; J.GC:20). Although this is also due to the gardens' dependency on volunteers, which limits the time that can be invested in exploration of new activities. Regardless, there are plans for improving the use of rainwater in the garden (J.GC:19). The lack of

financial continuation of the community gardens also limits the entrepreneurial activity in itself, although this is partly caused by a lack of time to attempt to gain access to resources rather than a lack of opportunity. For this reason, this indicator is scored as encouraging (+).

The opportunities provided for collaborative agents are found to be limiting (-). Within Hagihon there is institutionalised collaboration with outsourcing agents and private companies. However, actors are limitedly enabled to connect stakeholders due to the top-down nature of the policy, which is signalled by the need for approval by the IWA for new collaborations and the refusal of some proposals for collaboration (J.GC:7; J.GC:8). New collaborations are found to further improve current practices, such as the development of water flow monitoring with the use of cameras to detect pipe leakages or theft. This further decreases NRW-loss (J08).

Just as for collaborative agents, the options for visionary agents are restricted by the top-down character of policy. The IWA's required approval for Hagihon's Master Plan causes the visions of existing agents of change to be promoted within the business-as-usual scenario. Therefore, this indicator is found to be indifferent (0) for addressing water conservation in Jerusalem.

Condition 7: Multi-level Network Potential
The room to manoeuvre that is given to actors to develop a variety of alternatives and approaches is found to be indifferent (0). Unconventional collaborations are sought in the water utilities collaborations with private organisations facilitated by the NewTech program, such as the collaboration with Aquarius (J.GC:8). Those projects are aimed at going beyond small-scale pilots towards significant showcases (J.GC:8). Within Hagihon, the solutions offered by collaborations with private companies are mainly focused on NRW-reduction that form a partially redundant set of solutions. However, a protocol or platform is lacking on how to attract new unconventional collaborations or ideas. As a big corporation, Hagihon naturally attract technology. When there is a problem, Hagihon goes looking for it, but they do not use a protocol or certain set of channels (J.GC:1). Therefore, on the local level, an overall vision to steer research is lacking. On a national level, there is an inter-sectorial research agenda for the water sector (J.GC:16). Furthermore, employees are free to go to their managers with new ideas (J.GC:7), and also outsourcing professionals feel that they have room to manoeuvre (J.GC:5). However, the implementation of new ideas is largely determined by budget that has to be approved by the IWA, unless the money is from outside (J.GC:8). At the same time, there are instances where legislation can either support or limit the room to manoeuvre. New ideas that do not fit into existing policy, such as rainwater harvesting and rooftop gardening, can take advantage of the lack of legislation in order to proof the concept and get legalised afterwards (J.GC:20). This room to manoeuvre is very incremental and can work both positively and negatively. For instance, in the case of rainwater harvesting, legislation halted the project for several years because of safety considerations (J.GC:18).

The clarity and division of responsibilities to address water conservation is found to be indifferent (0).. Hagihon possesses the full responsibility over Jerusalem's water distribution. Within the utility, responsibilities are delegated to outsourcing professionals or collaboration with private actors, the interest of Hagihon is reflected in how these actors perform their delegated responsibilities as their collaboration is based on a tender bid (J.GC:2). Their involvement is dependent on Hagihon's perception of their performance (J.GC:5). They are employed based on tender bids mostly for a minimum of one year, and new cooperation can be initiated if there would be insufficient result (J.GC:2). Since Hagihon is the authority responsible for water in Jerusalem, it has the responsibility for all water policy (J.GC:1), which would include new water challenges.

Indicator 7.3 refers to the extent that legitimate forms of power and authority are present to govern the water challenge. This indicator is found to be encouraging (+). The establishment of Hagihon by the municipality made water governance independent from the local political arena. This shows the recognition

of the need for a long-term and integrated approach. Environmental reports that include water conservation are part of the annual reporting of the company (Hagihon, n.d.).

Condition 8: Financial Viability

The availability and affordability of water services and climate adaptation measures is found to be limiting (-). People can be connected to the water grid but at the same time be not connected to the sewage system. This is because they pay for their own connection to the sewage system as it is private property (J.GC:6). These people pay a lower water tariff (excluding the part for the sewage grid). Hagihon comes to empty the tanks bi-monthly and charges for that, also to try and motivate them to get connected to the sewage system. However, people can also get a private company to empty their tanks for less money (J.GC:6). In accordance with the previously defined concept of water conservation, this indicator is perceived as limiting (-). Although over time improvements have been, and are being made (J.GC:2; ACRI, 2017).

The consumers' willingness to pay for water conservation measures is found to be limiting (-). First, the municipality's willingness to fund initiatives is very low. Water conservation, or sustainability for that matter, is not a priority within the municipality (J.GC:17). For example, the municipality's sustainability unit is underfunded, with the community garden department receiving no budget last year (J.GC:17). Small investments are only made in projects that have fast and visible results, which often does not include water infrastructure projects, because it offers less publicity than projects with more visible results (J.GC:19). Infrastructure projects that also foster leakage reduction are generally not attractive for marketing and image-improving purposes (J.GC:19). The same applies to political purposes, since citizens want to see what happens with their money regarding public uses (McKinsey, 2016). Second, for consumers, the willingness to pay is strongly fragmented. The improved metering of water, which has led to 99% of the bills having accurate readings rather than estimations (compared to approximately 94% four years ago) (J.GC:5). This increased willingness to pay is reflected in the percentage of people paying through automatic bank transfer, which increased from less than 10% to 45% over the past 4 years (J.GC:5). For domestic users, there is a discount on water for certain groups. These groups are determined by the IWA and include disabled people and holocaust survivors (J.GC:6). Next to a lack of willingness to pay, there is inconsistency in the use of financial principles that enhance water conservation. On the one hand, the VAT-tax is added to domestic water prices after the basic amount of 3.5 m^3/ person/month is reached. On the other hand, polluter and user pays principles are comprised, since industrial users that have an overall consumption of more than 15,000 m^3 pay less than industrial consumers below that threshold (J.GC:6; Hagihon, 2018b).

Financial continuation within the water sector is found to be encouraging (+). The municipality's decision in 1996 to partially privatise the water distribution in Jerusalem by transferring responsibility to Hagihon has ensured that budget remains within the water sector (J.GC:2). Therefore, there is abundant and long-term financial continuation of water policy in general. However, project-based endeavours experience more limited continuation. First, the NewTech programme, which is not included in governmental baseline funding and is re-established every three years (J.GC:16). Second, the rainwater harvesting initiatives (J.GC:18) and the projects undertaken in community gardens (J.GC:17; J1.GC:9) that depend largely on donors (J.GC:18; J.GC:19). For that reason, this indicator is scored as encouraging rather than very encouraging. Moreover, a confined scope limits investment in promising water conservation projects and initiatives.

Condition 9: Implementing Capacity

Indicator 9.1 refers to the extent that policy instruments are effectively used and evaluated for stimulating and discouraging desired and undesired activities respectively. When looking at water policy, this indicator is found to be limiting (-) meaning that there are unknown impacts of policy instruments. First, from a general perspective, the impacts of desalination as a tactic for combatting water scarcity are only now being researched through a programme (J.GC:16). In addition, during the construction of the desalination plants, people where requested to save water in that bridging period. However, later the IWA made an

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

announcement that people had to use more water in order to finance the desalination plants (J.GC:15). Desalination plants are built as BOT-projects (Build-Own-Transfer), which made that the company responsible for construction needed funding during construction (J.GC:16). Second, as mentioned in indicator 8.2, the water tariff in itself is contradicting as a policy instrument. In industry, large consumers pay less for water than do small ones. Meanwhile, for domestic users exceeding the basic amount of 3.5 m^3/person/month corresponds with a higher water tariff. There is no knowledge on the counterproductive effects of this policy, nor is it questioned as it is established on a national level (J.GC:6). Simultaneously, there is the use of special taxes during droughts that increase the price of water (J.GC:16). However, in light of the contradicting water tariff policy, the overall effectiveness of this measure is expected to be low and temporary. At the same time, water tariff has increased over the years due to the high costs of desalination (J.GC:16; J.GC:17). In conclusion, although there appears to be fragmented instrumental use, there are unknown impacts of some of the baseline policy instruments, such as the water tariff. This makes that this indicator is scored as limiting rather than indifferent.

Indicator 9.2 statutory compliance, is found to be indifferent (0), since governance on water conservation in Jerusalem is characterised by strict compliance to national legislation. First, there is strict enforcement of the legislation that housing without building permits cannot be connected to the water grid. People with illegally connected houses are either disconnected (J.GC:4) or made to pay more for higher tariffs (J.GC:12). However, this type of enforcement is solely focused on water provision and results in limited compliance, because people need water and the underlying issue of permits and overall planning remains unaddressed (J.GC:12). Secondly, fragmentised legislation allows for flexibility and innovation to a limited extent. For instance, legislation says that it is prohibited to produce water, while it does not mention the collection of water. With that, the legality of rainwater harvesting is open to interpretation (J.GC:18). By just starting working in the grey margins of the law and illustrating that new concepts work exemptions from rules can be made, something that (ultimately) happened with rainwater harvesting initiatives in three schools. Similar processes have occurred elsewhere, such as with rooftop garden Muslala. Starting with permission for a small piece of the roof, expanding it as the concept is proving to work (J.GC:20). The examples show that giving proof-of-concept has led to the municipality giving exemptions from restrictions, although not necessarily changing the regulatory framework. Thus, flexibility and innovation are limitedly possible when actors are proactive, although not explicitly encouraged by legislation.

Lastly, the extent to which the city is prepared for both gradual and sudden uncertain changes and events is found to be encouraging (+), which means that there is fragmented preparedness. On the one hand, the city has a secured water supply in the face of growing water scarcity, something that is accounted for in Hagihon's Master Plan and with the construction of the Fifth Pipeline (J.GC:2). Israel's desalination tactic resembles a proactive approach towards the challenge of water scarcity (J.GC:15). Moreover, long-term trends are incorporated into the planning of Hagihon, such as population growth and growing water demand (J.GC:1). Furthermore, special water taxes have been implemented during past cases of drought, as a water conserving measure (J.GC:6). On the other hand, contradicting policy instruments, as mentioned in indicator 9.1, have negative implications on the preparedness.

Concluding remarks on the governance capacity of Jerusalem
This section aimed to analyse Jerusalem's governance capacity for water conservation. As far as technological advancement is concerned, it can be said that Jerusalem has a high governing capacity. Jerusalem has only 8.3% NRW-loss, which is low compared to global standards. The close monitoring of the water system has led to high information availability and transparency on water conservation as a consequence of technologies implemented by Hagihon. In addition, regarding wastewater treatment and reuse Israel is performing very well with a percentage of 85%, although this is lower in some parts of Jerusalem where a third of the sewage remains untreated. However, this is planned to be improved through the planning of the new sewage plant.

Next to the extensive use of modern technologies, the development of long-term water policy is secured. This is caused by the semi-privatisation of Hagihon in 1996, which guarantees the presence of an authority

that prioritises the management of water as well as financial continuation of water policy and a certain basic preparedness to changing circumstances.

At the same time, water policy in Israel is highly centralised. This constrains the authority of Hagihon that has to adhere to the IWA's national policy and guidelines. Hagihon is also dependent on them for the approval of Master Plans. Additionally, the centralised approach influences the possibilities for collaborative agents to start new unconventional collaborations and makes that visionary agents cannot go beyond promoting the status quo. Ideas that put responsibility with the individual user are often found to be unpopular, such as the secondary use of greywater and, although to a lesser extent, rainwater harvesting.

A top-down approach regarding water policy does not have to compromise Jerusalem's capacity to govern water conservation. However, it is found that (national) policy instruments are contradicting in terms of water conservation, such as the water tariff, thereby automatically influencing the city's capacity for conserving water. Moreover, the nationally determined policy has shown to be insufficiently embedded in the local discourse in certain instances (e.g. Fifth Pipeline). This has resulted in resistance, but the limited stakeholder engagement has compromised the number of options and alternatives that are being taken into consideration. Consequently, core values of residents are being compromised.

Improved stakeholder engagement of stakeholders that is not merely informational and consultative but more participatory could improve the governance capacity regarding water conservation. Engagement that starts earlier and lasts longer as well as involvement that has larger influence on the end-result. This could improve the relevance of policy and the protection of core values. Additionally, the relevance of policy could be further improved by the restructuring of evaluation cycles between national and local authorities.

Although this study has gained insights into Jerusalem's current capacity to conserve water, it also raises questions that require additional research. First of all, the dependency of local policy on national policy and guidelines raises the question what the national governance capacity is towards conserving water. This could gain insights to what extent policy instruments are truly contradicting and limiting to water conservation in a local context. Secondly, future research could look into the possibilities for stakeholder engagement and protection of core values in long-term conflict situations. This could improve the city's performance regarding water conservation despite political circumstances. Third, another object of study could be the advancement of the opportunities of agents of change for unconventional measures in light of a strong narrative against these measures.

All in all, Jerusalem's governance capacity is advanced in terms of technology. From a societal perspective, there is room for improvement for the whole of the city. Deeper engagement of stakeholders, especially communities, could generate a positive feedback loop and enhance the city's governance capacity for water conservation.

6.2   Jerusalem's experiences with collaborative learning

In the following sections specific aspects of collaborative learning are examined with regards to water conservation in community gardens in Jerusalem. These aspects include: learning processes, learning products, institutional structure, social dynamics, and technology and functionality. In this analysis, experiences with collaborative learning in Jerusalem are examined. Jerusalem has approximately 830,000 inhabitants and is a city with religious, historical and national significance.

Community gardens are emergent phenomena in Israel and their number is rapidly growing. Community gardens are described as "green space managed (and often initiated and developed) by a neighbourhood community which hosts urban gardening activities" (Filkobski et al., 2016). The gardens either use individual

or shared plots on private or public land while producing for instance fruit, vegetables, flowers and plants. Community gardens provide important functions to urban residents, as they can serve as sites for encounters between different groups of citizens. Furthermore, community gardens can create "civically engaging green open spaces" (Filkobski et al., 2016). Thus, community gardening is a practical tool for the application of sustainability, while combining society and environment. The cultivation of the land can be reflected in various ways, while the common ground for all are the relationships that a community garden creates between citizens and between citizens to the nature and soil in their environment (Ferris et al., 2002). In Jerusalem, the capital of Israel, the number of community gardens is growing rapidly, counting 70 community gardens in 2018.

Learning Process

In this section the learning process is examined, which includes the process of acquiring, translating and disseminating information (Heikkila & Gerlak, 2013).

In terms of acquiring information, the major source of knowledge on water conservation in community gardens is the municipality of Jerusalem. First of all, on the website there are electronic books available on different aspects of community gardening. There is also information available on irrigation and water saving measures. The information is only available in Hebrew, which could be a barrier to the Arab and English speaking actors in the community gardens. The municipal agricultural coordinator of the community gardens (J.CL:6) however explains that not all water conservation measures are covered because they are not legalised in Israel, such as rainwater harvesting and reusing greywater. These measures are only allowed if people have a permit. Concerning the reuse of wastewater, one interviewee (J.CL:13) explained that at the Tel Aviv University there are three pools outside of the university where the wastewater from the building is treated. This is for educational purposes to show students how the wastewater is filtered within these pools. It took a long time for the university to get a permit from the Ministry of Health, and even when they received the permit they got very stringent maintenance rules. The university needs to check the quality of the water every week to make sure that diseases are not spread. Concerning rainwater harvesting, several community garden activists (J.CL:7 and J.CL:13) mention that although the use of rainwater is not legal, many gardens and households apply rainwater collection measures anyway. For instance, an interviewee (J.CL:13) explains that their greenhouse was built in an angle which allows the rainwater to runoff the roof where it is collected in the gutter. Then it flows into a tank and it is pumped back into the greenhouse. The interviewee (J.CL:13) states that "*it is illegal to collect rainwater and then reuse it, but we do not have a permit. There are no permits available, in Israel at the moment there is a separate lobby that is lobbying in the national government for the Ministry of Health to allow and permit the collection of rainwater and the use of grey water. But we do it, individuals who build houses, a lot of people know that it is really the way to go so they are doing it anyway. It is illegal because the Ministry of Health did just not develop a policy. At the moment they just say collecting it is water that is not treated so you do not know the quality, therefore it is dangerous and illegal*". The municipality thus offers a considerable amount of information about different aspects of community gardening, but does not include all relevant water conservation measures because of current regulations in Israel.

In addition to information on the website, two municipal community garden coordinators help community gardens face-to-face. The coordinators visit all the gardens once in a while, or the activists can visit the Nature Museum Garden to ask them for advice or help. The Nature Museum Garden is the hub of all community gardens since it is the most active garden in Jerusalem, and therefore it is also the place where the municipal coordinators are located (J.CL:5, J.CL:6). One interviewee (J.CL:5) mentions that "*I think the major inter-relation between the community gardens in Jerusalem is through people including* [agricultural community garden coordinator] *who are actually responsible and officially employed by the municipality for the community gardens in Jerusalem. So they are the ones to integrate the other ones to initiate get-togethers which in most of the cases will be at the Nature Museum community garden […]. For professional questions*

*the best person to ask is [*agricultural community garden coordinator] *for the gardening aspects and (community coordinator) for the community aspects*". The coordinators support the activists in different ways, not only by providing tools but also by helping them with the organisation of events. There are many events organised in the gardens, from religious get-togethers to music events. Many of these events also have an educational aspect, for instance teaching children how to grow potatoes or how to irrigate a garden. Besides events, the municipality coordinators also organise workshops for all community gardens in Jerusalem. The agricultural coordinator (J.CL:6) explains that it depends on the season how often the workshops are organised, "*now I open a course next month that is a yearly course, we meet once per month. Each time we speak about something else, also about water use and irrigation systems how to maintain it and how to use it. The idea is to make a course that people can see all over the seasons how to work in the garden*". During this course they meet for two hours, and community gardens can sign up for free. In terms of disseminating information the municipality thus uses multiple platforms, including their own website, events and workshops. To make sure that everyone understands the information (translating of information) they make sure that they meet the community gardens face-to-face regularly.

In addition to the municipality, interviewees mention different platforms where they acquire information on water conservation. For example professional network groups where ecological organisations share recommendations on permaculture and water conservation, but also professionals such as gardeners are asked for advice. One interviewee (J.CL:14) hired a gardener to come and design their community garden, "*he is also a water specialist. So it is very well thought out […]. The gardener had all the knowledge, so he was able to implement that and how he chose to irrigate this whole space*". Also the interviewee explained that when she was designing the garden, the drip irrigation company Netafim would help: "*They have like a whole educational department, they even organise for different companies to come and do good for the communities. So the workers will come out and do an installation for the good cause*" (J.CL:14). There are thus different ways the community garden activists collect information. Facebook and WhatsApp are also mentioned often by the community garden activists as sources of information. These platforms are used to share experiences and knowledge between the different gardens within in Jerusalem, and sometimes even in the entire country. One of the interviewees (J.CL:4) however mentions difficulties with the community gardens Facebook group: "*Not all people from the Arab society know how to read Hebrew, and all of these pages are in Hebrew. So I am making a page for translation*" (translating of information). This interviewee is thus translating the information so that the Arab community can also learn from other community gardens.

Learning Products

Following from the learning process is the emergence of learning products. The learning products that are found in Jerusalem will be discussed in this section.

In terms of cognitive products, community garden activists are very well aware of the urgency of water conservation, not only within the community garden but also in other activities, "*it is an instinct*" (J.CL:1). A strong conclusion from the interviews is however also that all community garden activists find environmental conservation very important, which potentially is less the case for citizens that are not involved in community gardening. This is also something emphasised by one interviewee (J.CL:6): "*The people that come in the gardens are usually more aware of environmental problems and you will not see a community garden that looks tropical because they use a lot of water. So usually the people that I work with, people are aware. But on the other side this is the language that we speak […]. And again we are trying to change the way people think about how they use the environment all the time. But that is a small percentage of people in Jerusalem*". Another interviewee (J.CL:14) explains that all citizens of Jerusalem are aware of water conservation, but it does not necessarily lead to behaviour change. According to one interviewee (J.CL:12) this is because of the mind-set of citizens, "*it is capital way of thinking, we have everything and we want to be like Europe and the United States. We do not want to think about always that we do not have water as like a third world country […]. It is thinking about if I have the money, what do I care about the country. I do not care spending more*

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

money on water because I have the money and it is fine, I want to feel like I can take a bath". Furthermore, the interviewee states that although people think about it they do not want to change their activity, "*it is not a very visible problem in the way that you need to go to the river and get water".* This is also emphasised by the community garden coordinator from the Society for the Protection of Nature in Israel (SPNI): *"there is a balance here between first world and third world. We are very first world in our technology and the way people want to live, but very third world in our infrastructure. There is a dichotomy there*".

In addition, behavioural changes can be identified in the strategy of the city's water company Hagihon. Since Israel has endured severe droughts in recent years that depleted freshwater sources, the irrigation of municipal parks was restricted in Jerusalem which in turn negatively affected the quality of life in the city. Since the desalination plant did not meet the expectation of meeting the water demand, the water company decided to look into treating and reuse wastewater (J.CL:8). One of the largest treatment plants of Israel is located in Jerusalem, and is referred to as the Sorek plant. Sorek is one of the three plants in Jerusalem operated by the Jerusalem Company for Sewage and Treatment Plants (MAVTI). The Sorek plant treats 80,000 m³ of wastewater (50% of the wastewater produced in Jerusalem) every day, flowing from the western basins. Besides the Sorek plant, the treatment company operates two other smaller treatment plants in Jerusalem, Homat Schmuel and Nebi Musa. These plants treat sewage flowing from the eastern part of Jerusalem (Water-Technology, n.d.). The Homat Schmuel treatment produces high-quality treated effluent which is used for the irrigation of municipal parks and gardens (Hagihon, n.d.). Currently the treated effluent is thus only used for watering the municipal gardens, not yet for community gardens. However, one interviewee (J.CL:14) states that the water has a good quality so it can also be used for community gardens, but "*it is not allowed by the Health Authority to use it for the irrigation of edible products such as vegetables*". Every month the operators of the treatment plants have to send a report to the Health Authority of Jerusalem about the quality of the influent and effluent quality (J.CL:14).

Institutional Structure

In this section the institutional structure of community gardens in Jerusalem is discussed. Collaborative contexts can differ extensively based on who participates in the collective, what roles different actors play, and how those roles are structured. Therefore, in this section the roles and responsibilities of different actors in Jerusalem are examined (Heikkila & Gerlak, 2013).

In 2009, the National Community Gardens Steering Committee (NCGSC) was established through a collective effort of the Ministry for Environmental Protection and the Joint Distribution Committee (JDC). The Committee worked together with the Ministry of Agriculture, Ministry of Public Health, Ministry of Education, and Ministry of Work and Welfare to develop a national plan for setting up community gardens in Israeli cities, with the objective to develop the gardens as a social-economic-environmental platform. The community gardens in Jerusalem are characterised by a complex web of global and local partners that promote the gardens in multiple ways: funding, guidance, education, infrastructure and community outreach. In this way, the production of gardens is arranged by numerous governmental and nongovernmental organisations which each hold a different agenda and distinct goals for the gardens.

In terms of duties and responsibilities, water in Jerusalem is provided by water company Hagihon. The Hagihon company was founded in 1996 by the Jerusalem Municipality and operates as an independent corporation by authority of the Water and Sewage Corporations Law (Hagihon, n.d.). The Water and Sewage Corporations Law was enacted in 2001, resulting in a change in the institutional structure of the water sector. Instead of the municipal water departments, the water and sewage corporations and an independent regulatory authority, the Water Authority, were established. Many of the interviewees mention that the government has an advertising campaign that emphasises the importance of water conservation in the entire country. This campaign was initiated by the Water Authority, urging citizens to cut back on their water use by using the slogan 'Israel is drying out again'. The aim of the campaign is to encourage Israelis to limit their

use of water as a way of life. One interviewee (J.CL:14) knows the commercial by heart: "*the commercials go like this: 'even though we do desalination and because of that there is water in the tap, we still do not have water to waste'. That is exactly the line, and then they say 'try to take a two-minute less shower*". Although major desalination efforts, Israel was entering its sixth consecutive year of drought. In combination with climate change, growing populations, and the increasing use of its water this is a major challenge. Besides the advertising campaign that is shown on television, radio and internet, the government will reduce water quotas for agriculture, limit municipal gardening, construct additional desalination plants, repair and upgrade the municipal water and sewage systems and adding water to the Sea of Galilee (Sedley, 2018).

In terms of disciplinary boundaries, the municipality is the main spokesperson for the community gardens regarding water since the municipality arranges the connection to the municipal water pipe and pays for the costs. Various interviewees (J.CL:1, J.CL:7 and J.CL:12) state that if they have water issues they will ask the community garden coordinators for help, but none of them are in contact with the water company Hagihon. In terms of duties and responsibilities, the municipality has hired two people that work as coordinators for all 70 community gardens in Jerusalem, where one person focuses on the gardening aspects and the other person on community aspects. They support the community gardens in different ways, for instance by providing free water and tools, and helping them with any difficulty or question they have (capacity and resources). Furthermore, if a new community garden is started they help with the design of the garden, keeping in mind water conservation measures. One interviewee (J.CL:1) explained that before they had the community garden 'status' they were paying a lot for water because they were still on the private rate: "*It was a big mess. We had about four people that had to pay bills of thousands of shekels [...], we had leaks in the pipes, so it was not that we were watering the garden sensibly. We were wasting water entirely*". The land of the community gardens still belongs to the municipality, but the activists do not have to pay rent. Since it is not the property of the community garden activists, they also do not have any legal rights. However according to one of the interviewees (J.CL:5) this is not a big issue anymore since the people and organisations involved are increasing over time, which in turn increases the power of the activists. Furthermore, the municipality also works together with relevant organisations, for example the Society for Protection of Nature in Israel. The municipal coordinators meet the community garden coordinator of SPNI once per two weeks.

In terms of duties and responsibilities, in most of the gardens the activists are not officially assigned to a role, but it is something that happens naturally. For instance because someone has more affinity with a certain task. In some of the gardens there are clearly defined roles, for instance one interviewee (J.CL:1) explained that she keeps in regular contact with the municipality and makes lists for the municipality when tools are needed whereas another activist in the garden takes care of the newsletter. This newsletter is sent once per month through e-mail, to everyone that is interested in this specific garden, their activities and their recent successes and failures. However, within all of the gardens the level of involvement of activists differs. Some activists are involved daily, while others help once in a while. Most of the time the activists that are less involved do not have a specific responsibility in the garden.

In terms of forum for deliberation and boundary objects, there are multiple arenas to facilitate collaborative learning that encourage exchange of knowledge and experiences on urban gardening and water conservation. In January 2018, the Sustainable Jerusalem Lobby was founded to influence Jerusalem's society and decision-makers. Members of the lobby are communities, organisations, institutions and individuals which join forces to share multiple goals, for instance to place urban sustainability on the public map as an ingredient for cleaner, greener and healthier Jerusalem (Jerusalem Green Fund, n.d.). Another organisation is the Food for Jerusalem forum, which also includes a diverse group of actors. One interviewee (J.CL:13) is the coordinator of this forum. They bring various actors together to understand what the needs and challenges are, and then communicate the outcomes to the municipality. In this way, they try to put sustainability higher on the political agenda.

Social Dynamics

In this section the social dynamics within and between community gardens in Jerusalem are discussed. Social dynamics can play a key role in promoting and obstructing collaborative learning, and includes variables such as inter-personal trust, open communication and leadership (Heikkila & Gerlak, 2013).

In terms of inter-personal trust, the interview results clearly showed that all actors felt that there is a good inter-personal basis for dialogue and collaboration. The interviewees mention that the activists have similar interests which makes it easy for them to find a common ground. Gerlak and Heikkila (2011) conceive leadership as a wide-ranging role encompassing the ability to bring diverse interests together, ensure new ideas are fostered and actors are committed to learning, create a learning and information-sharing climate, experiment, and facilitate communication across diverse members of the collaboration. The two community garden coordinators assigned by the municipality are the ones that take leadership concerning different aspects of community gardening including water conservation. The agricultural coordinator from the municipality (J.CL:6) states that: "*it is a strength of the community to have a place like this, that they can meet there and they can speak and be involved in what is happening in the city and slowly the visions from the community garden is growing leaders that can lead a different point of view about the environment and a different point of view how we see the city, not just cement and asphalt and more building and shops, to look in a different angle […]. It is a huge process that the community is working together […]*". From this statement, it becomes clear that the coordinators of the municipality are not only leaders, they also attempt to make the community garden activists leaders in their community so that they are able to teach people about the importance of environmental conservation (leadership).

Within the community gardens decisions are in general made collectively (open communication). One interviewee (J.CL:3) explains that "*all the people make decisions together. A meeting is organised once per month to talk about it. Furthermore every Friday we come together to eat with everyone that wants to come*". However, some of the activists also mention that when issues are urgent sometimes decisions are made without consulting everyone, "*sometimes it does not work because not everybody is coming on the same times or sometimes things need urgent feedback and decisions, but as much as possible we make decisions collectively*" (J.CL:5). One community garden activist (J.CL:12) shared a different experience and explained that power plays an important role in communities: "*in the community garden I work, there is a woman that wants to be part of the municipality, she has nothing to do with gardens but she sees it as a way to take power, so it is very delicate. Also be careful what you say, where you have it and who you meet with*". According to this interviewee, each community has people that have power within that community. These people are dominant when important decisions need to be taken, but they are not part of the community garden activists' group (leadership).

In the bigger picture, each garden in Jerusalem looks different and each community behaves different. This is also something that is noticed by the interviewees, especially by the municipal agricultural coordinator that works for all the community gardens in Jerusalem (J.CL:6): "*You have ultra-orthodox gardens, so there are all kinds of rules in Judaism how to do, how to plant, how to grow. And there is Sur Baher (Palestinian neighbourhood), it is a different world. Sometimes I have days that I need to go to an ultra-orthodox garden and one Arabic. So it is very interesting. So also need to change vocabulary to each garden, because they have differing views. I need to know with who I am speaking. It depends on the community garden and activists if they are willing to receive criticism and feedback, it is very personal. I am already five years in my position so I know all the people and know how to try to, but again it is a soft matter in the end […]. If they want to understand they will understand, if not they will see by themselves what they do good and what they did wrong*".

Technology and Functionality

In this section the technological and functional domain of the community gardens is discussed as it also influences how actors are organised and how they interact. It includes variables such as the capacity to process information, the adequacy of available information and the transparency of technological processes to every actor involved with community gardening in Jerusalem.

The community garden activists communicate with each other through different communication tools, including telephone, e-mail, WhatsApp and Facebook. There are differences between the gardens how much contact they have with other activists, but the main platform that is used by the activists is Facebook. Here activists can find events that are organised within the gardens, or share knowledge and experiences on community gardening. Furthermore, also the garden coordinators of the municipality make use of this Facebook page. The activists seem to view Facebook as a transparent tool since it is an open platform (J.CL:7) (transparency of technological processes). Thus most of the community garden activists are satisfied with the current communication tool, however some also express difficulties with the platform. An Arabic speaking interviewee of a community garden expressed the need for information in Arabic instead of Hebrew (capacity to process information). This is an option that is available on the digital social platform developed within the POWER project. See section 3.4.3 for an elaboration on the potential role of the DSP to enhance collaborative learning.

In terms of adequacy of available information, there are no publicly accessible databases which show how much water is used within community gardens. According to an employee of the metering company Milgam (J.CL:10), there is not a specific database of water use in community gardens in Jerusalem. However, there is a database for municipal gardens. The community garden coordinator of the municipality (J.CL:7) hopes that in the future they will also have this kind of database for the community gardens, but they "*do not have enough resources*". Although at this moment there is no database available, all people that have access to the garden can see how much water is used. One interviewee (J.CL:8) explains that people can see how much water is used on the computer, however "*people forget the computer and then get a lot of wasted water, because the computer is not being looked after properly […]. So it is a thing about how you remind people that they still have to go out to the garden and check, you still need to have the human eye*". The municipal community garden coordinator is the person that reminds people to look after their computer.

Concluding remarks on collaborative learning in Jerusalem
Community garden activists are very well aware of the urgency of water conservation, but not all citizens of Jerusalem internalised this in their behaviour. Community garden activists are not necessarily representatives of all residents of Jerusalem since they are very aware of water issues, and it is therefore very important to educate all residents on water conservation. Information on water conservation in community gardens is widely available online, for instance on the municipality website and on Facebook. An important limitation to the provided information is that it is only available in Hebrew, which could be a barrier for the Arab and English speaking community garden activists. In addition to online information, the municipality assigned two people as community garden coordinators which are responsible for information dissemination on a variety of topics related to community gardening. The information they provide is not fully complete, since not all water conservation measures are legal in Israel (e.g. rainwater harvesting). This does however not necessarily mean that people do not apply these measures, as for instance rainwater harvesting is a common-used practice.

The local water supplier Hagihon shows leadership in water conservation since they are using treated wastewater for irrigating municipal parks as a way to conserve freshwater resources. Besides this, a lobby organisation was initiated by a local NGO to influence Jerusalem's society and decision-makers to put sustainability higher on the political agenda.

In terms of learning, community gardens learn from each other by sharing knowledge and experiences through meetings organised by the municipal agricultural coordinators, but also through online platforms

such as Facebook and WhatsApp. To further reduce water used in community gardens and to increase transparency, data on water consumption in community gardens should be made publicly available.

6.3 Potential role of the POWER DSP in Jerusalem to address water conservation

Based on the governance capacity analysis and the in-depth analysis of collaborative learning provided in the previous sections, here the potential role of the DSP to strengthen the governance capacity dimensions is discussed. We focus on the first four conditions of the governance capacity framework – awareness, useful knowledge, continuous learning, strengthen stakeholder engagement – as the DSP has the most potential to strengthen these conditions. The five remaining conditions of the framework are discussed together. In the end of this section recommendations are provided on how the digital social platform can be improved in Jerusalem. Box 7 below, provides the key characteristics of the DSP of Jerusalem. These characteristics are retrieved from other deliverables of the POWER project, including D3.4 (report on the gamification model used within POWER DSPs) and D3.5 (report on the POWER engagement model).

Box 7: Key characteristics of Jerusalem's DSP

The DSP is a tool for citizen engagement and awareness raising on water conservation issues. The main aim of the Jerusalem DSP is to promote water conservation behaviours, achievable quantifiable water savings and improve awareness regarding water quality by sharing data with other water utilities. The DSP communicates many different types of information to help stakeholders understand the challenge of water conservation. The interface of the DSP allows users to browse information and leave feedback in the form of comments, documents or polls. The DSP provides wide accessibility of information on the water challenge to citizens through data presentation that can be easily understood and interpreted by stakeholders of Jerusalem in different languages. Users can change the language of the platform from English to Hebrew or Arabic. User activity can be shared through social networks, such as Facebook. In addition to the online platform, there is also a mobile application available for Android and Apple.

The following information can be found on the DSP of Jerusalem. First, there is information on smart irrigation in Jerusalem. This page contains 10 tips for saving water in the garden and provides an irrigation calculator. Users can also download documents that support the information provided on smart irrigation. Furthermore, there is information on community gardens, cleaning of water tanks, water quality and non-revenue water. To support information there are several visualizations, such as a GIS map that shows all water piping works in Jerusalem and a map with all community gardens. The aforementioned information is written by the water company Hagihon. In addition to information that aims to increase the knowledge of users on water conservation, there is information available on the POWER project (including the ConCensus approach; D4.4). Besides information pages to increase knowledge on the water challenge and the POWER project, there was also a contest. Users of the platform had the opportunity to submit their idea for innovative solutions to sustainability issues in Jerusalem. This was an interactive element of the DSP as people had the opportunity to submit their idea and other people had the possibility to comment and vote on the ideas.

To increase user interaction with the POWER DSP and the underlying water issue, the platform integrates gamification techniques. The POWER project introduced the DSP to help motivate people in Jerusalem to gain knowledge and raise awareness about water conservation. However, if there is no imminent threat of a drought it is difficult to incentivise people to visit the DSP. As a consequence, people need additional incentives and strong persuasion to engage in learning about and performing water saving actions. Therefore, gamification techniques are used in the platform to provide additional motivation drivers and incentives to help increase user interaction with the DSPs attempting to raise awareness on water conservation in Jerusalem. An important element of the gamification model is the point mechanism that uses points to reflect the extent to which a given action contributes to increasing preparedness on a given dimension. There are different dimensions used in the platform. The first set of dimensions reflect their individual progress in reaching the objective of personal preparedness: problem awareness, know-how and readiness to act. The second set of dimensions reflect how user actions on the DSP can have a real-world impact on the individual, social and political level. By performing different actions (e.g. comment on an article or share an issue on social media), the users obtain points. At present, there are no non-digital rewards attached to points system. On the personal user page, visualisations are provided on the different dimensions (e.g. how much points are gathered on the know-how dimension).

Potential of the DSP to raise awareness

The citizens of Jerusalem are in general aware of water scarcity and strategies being used, such as wastewater reuse and seawater desalination. However, there is a lack of awareness on water conservation as a way of combatting water scarcity. The DSP aims to be a tool to raise awareness on water conservation. To raise awareness it provides a wide variety of information on water conservation and related topics such as non-revenue water. Two interviewees (J.CL:2 and J.CL:4) also emphasise that it is important to increase the awareness of people that do not conserve water in Jerusalem, including large businesses. The DSP has the potential to be a platform to engage with multiple stakeholder groups, such as citizens, businesses and decision-makers. An advantage of the platform is that it offers information not only in English, but also in Hebrew and Arabic. Platforms that are used by various community garden activists such as Facebook and the municipal website are limited to Hebrew, and therefore not accessible for all citizens of Jerusalem. A potential barrier for the DSP is that the local sense of urgency to conserve water is low. If citizens do not experience an imminent threat from water scarcity they tend to be less willing to visit the DSP. In order to tackle this, there are multiple gamification elements developed to persuade people to use the platform and learn about water conservation. See box 7 for more information on the gamification elements.

At present, community garden activists use several tools to communicate with other gardens, including WhatsApp and Facebook. The municipal coordinator does therefore not see the added value of the DSP, since there is already a large and active network between community gardens, the municipality and NGOs such as the Society for the Protection of Nature in Israel. This requires additional efforts to encourage stakeholders to use the DSP as well as efforts to align the platform better with existing citizen engagement initiatives. There are significant differences between the DSP and platforms such as Facebook and WhatsApp. The latter is merely a way of sending messages, pictures or videos to another person or group. It thus offers far less features compared to the DSP. Although WhatsApp can still be very relevant for sharing knowledge and experiences, it is solely a platform for the community garden activists. Other important actors such as the NGOs and the Jerusalem Municipality are not involved, whereas the DSP does offer this possibility. Compared to WhatsApp, Facebook has more potential. To share something on Facebook you first need to register. After registration, it is possible to be part of the community gardens Facebook group. Facebook and the DSP have similar features, such as the need to make an account and the possibility to share something with other people. There are however also differences. A first example is that on the DSP there are several pages for different challenges within Jerusalem, whereas the Facebook page only has one page which is solely focused on community gardening. A second example is that the DSP uses gamification as a way to motivate users of the platform to become more aware of water conservation. This means that for instance when users read a page about smart irrigation they receive points. On their personal page, users can see how they score on different aspects, including: problem awareness, know-how and ready to act. This is a feature that is not offered by Facebook. There are however also advantages to Facebook in comparison to the DSP. An example of an advantage is that Facebook is not limited to community gardening, but it is also a way to update and communicate with personal relations as it is a social media platform. In this way people do not necessarily need to visit another platform to learn about community gardening, since they are already using social media.

Potential of the DSP to increase useful knowledge

There is a large availability of information which is also transparently communicated by various organisations. The knowledge cohesion between and within sectors in Jerusalem can however be improved. For instance, the knowledge on water conservation is still fragmented. The DSP however aims to increase the knowledge of different stakeholder groups on water conservation and provides a wide variety of information on the topic. A limitation to the platform currently is that all knowledge is collected and written by the water company Hagihon. Other organisations such as the municipality and the non-profit organisation 'Society for the Protection of Nature' in Israel could also provide valuable insights. Although the DSP could in theory strengthen knowledge cohesion in Jerusalem, improvements can be made (e.g. by including more

organisations that contribute to the information provided on the platform). In terms of collaborative learning, the DSP is a platform where users can acquire information and therefore enables the collaborative learning process.

One of the interviewees (J.CL:1) emphasised that the platform could be a useful tool to share ideas with other community gardens. The idea of the interviewee (J.CL:1) was to make "*a smart chart of all the plants that use little water, according to the season and water consumption. And the benefits, if it can be used for food, if its botanic protection for other plants, if it repels insects, blooms for many months. With this kind of information, community gardens can design their gardens better. I think the platform is a good place for that. But I could not go inside"*. Another interviewee (J.CL:12) expressed the need for information that is presented in a similar way as the platform Pinterest, because "*you can write whatever you are interested in and if you are interested in gardening, it gives you all kind of different ideas. So that is I think a great thing. Things like pictures that you can by yourself in the garden"*. This is something that the respondent would like to see on the platform. Furthermore, the interviewee states that he would want to use the digital social platform if it is friendly to the user.

Potential of the DSP to enable continuous learning

As mentioned previously, there is a top-down approach in Israeli water policy in a way that mutual learning does not occur often. Organisations such as Hagihon do not consider in general interactive cross-stakeholder learning, and mostly limit their communication to informative forms. The DSP developed by the POWER project could enable cross-stakeholder learning, and more-over it could be a potential tool for organisations such as Hagihon to include stakeholders' opinions. For instance, Hagihon aims to reduce non-revenue water but needs citizens to alert them if there is a water leakage in the city. In order to optimise this process, they could use the platform to ask for opinions from citizens how to make this process as easy and efficient as possible. Another example is that Hagihon could ask for solutions to current water issues in Jerusalem, which could perhaps enable cross-stakeholder learning.

Potential of the DSP to strengthen stakeholder engagement

The extent to which stakeholders are involved in decision-making is found to be limited, as well as the protection of stakeholder's core values. As mentioned in the previous section, the DSP can function as a tool where stakeholders opinions can be included on a variety of topics. Furthermore, it can connect stakeholders from various communities. The DSP is offered in multiple languages, and therefore it is accessible for all communities. To further strengthen stakeholder engagement, it would be of added value when stakeholders from different societal layers contribute to the content of the DSP.

Potential of the DSP to strengthen additional conditions

The platform can be used as a way of communicating management ambitions (condition 5; see Figure 1). Furthermore, information that is provided on the platform and stakeholder opinions could be integrated into water conservation policies. It was found that actors are limitedly enabled to connect stakeholders due to the top-down nature of the policy. Just as for collaborative agents, the options for visionary agents are restricted by the top-down character of policy system (condition 6). Although the platform will not reform the political system, it can function as a tool to connect stakeholders, with the precondition that these stakeholders are present on the platform.

The DSP can be a platform to connect all stakeholders (Mukhtarov et al., 2018). People could share their experiences with water availability through the platform in their own language. In the collaborative learning research in community gardens it was found that there is a difference between awareness and actual behaviour change. Although citizens are aware to a certain extent of water scarcity, it does not necessarily lead to water conservation behaviour. Jerusalem's DSP aims to make citizens more prepared in order to

combat water scarcity by providing information and tips on water saving measures. Furthermore, it visualises the progress of users concerning preparedness. In addition, users can share their knowledge and experiences on water conservation which enables collaborative learning.

Box 8: Recommendations to ensure optimal use of Jerusalem's DSP

The DSP has high potential to raise awareness and increase useful knowledge of stakeholders. To ensure the optimal use of Jerusalem's DSP to address water conservation, we provide the following recommendations:

1. In Jerusalem there are already platforms available to address the water challenge in the city, such as a Facebook page for community garden activists. It is therefore recommended to align the DSP with existing citizen engagement initiatives by establishing a collaboration with the existing public participation mechanisms. This can lead to more outreach, involve more stakeholders and avoid competing with alternative initiatives;

2. The amount of information on water conservation measures for community gardens should be further increased on the DSP. Information should be updated regularly to ensure that all community gardens are included on the map and that recent innovations are included;

3. The main contributor to the platform is the water company Hagihon. To minimise bias, it is recommended to recruit other stakeholders to contribute to the knowledge provided and encourage an open debate on the DSP, such as the municipal community garden coordinators;

4. Although users of the DSP can earn points by getting informed and engaging with water challenges in Jerusalem, no non-digital reward stems from collecting those points. Positive reinforcement could be fostered by giving tangible rewards when a certain number of points is collected by users as a way to increase the number of visitors on the website.

---

7   Conclusions

This report has provided an overview of the governance situation in four POWER Key Demonstration Cities (KDCs) concerning diverse water challenges. The KDCs of Milton Keynes, Leicester, Sabadell and Jerusalem have been studied according to the governance capacity analyses and in-depth case studies on collaborative learning. Furthermore, this report examined the potential of the Digital Social Platforms (DSPs) to address a variety of urban water challenges. In the following sections, the seven questions that were posed in the beginning of this document are answered based on the results of the governance analyses of the KDCs. First, we provide an overview of relevant stakeholders in the KDCs. Subsequently, we discuss the governance conditions and indicators that are most encouraging or limiting the governance capacity to address the water challenges of the KDCs. Then, we discuss the experiences with collaborative learning, the key characteristics of the DSP, and the potentials and barriers in the practical application of the DSP. Lastly, we conclude this chapter with recommendations to improve the DSP to further enhance urban water governance.

7.1   An overview of relevant stakeholders in the KDCs

In this section, the sub-questions '*who are the most relevant stakeholders? What is their interest and problem definition? Which collaborative alliances do already exist'* are answered.

In each of the four demonstration cities, an importance/influence matrix was constructed to identify stakeholders, categorise them, and specify their roles and responsibilities. In this matrix, importance referred to the priority given to satisfy the needs and interests of a different stakeholder. Influence related to the power of stakeholders to influence a policy, plan or objective. In all of the four cities, stakeholders of different societal layers were present, including state, market and civil society.

In the case of Milton Keynes and Leicester, state actors are the key players to address the water challenge at hand. For instance in Leicester, governmental bodies from the national, regional and local level have high importance and high influence in terms of flood risk management. In contrast, stakeholders with low influence have a higher chance of being affected by possible flood hazards, such as property and home owners. The stakeholder matrix gives an overview of stakeholders that could be given more power in the decision-making process. For instance, the local government in Leicester can use the DSP as a tool to include citizens´ opinions in their local flooding policy. It depends on the specific water challenge to what extent certain stakeholders are involved. In general, it can be concluded that from all societal layers stakeholders are involved in water challenges although their actual power to influence policies or plans varies. Since there are many actors involved with sometimes competing objectives and interests it is often complex to address a given water challenge. Given this complexity it is important that collaboration takes place between different actors. For instance, in many Refill projects in the UK there is a partnership between key stakeholders which is essential for a successful development of the project within the city. To further strengthen partnerships between different stakeholders, online platforms such as the DSP can play an important role. Stakeholders can for instance share knowledge and experiences on the DSP which can enable cross-stakeholder learning.

7.2   Governance capacity to address the water challenges in the KDCs

In this section, the sub-question '*which governance conditions and indicators are most encouraging and limiting the governance capacity to address the water challenge in each of the four demonstration cities?'* is discussed.

Baseline governance capacity analyses have been conducted in the KDCs to explore the governance barriers and opportunities. Table 8 presents the results of the governance capacities to address the diverse water challenges in the KDCs. The overview shows which conditions can be strengthened in each of the cities. In the case of Leicester, the 'knowing' dimension scores by far the highest compared to other dimensions.

Despite incorporating flood risk in various local strategies, there are some constrains to effectively address the water challenge. For instance, there are many actors involved with different roles and responsibilities, and balancing flood risk with spatial planning is one of the major challenges for the city. In comparison to the other demonstration cities, Leicester has the most encouraging governance capacity to address their water challenge. In Milton Keynes and Sabadell, the overall governance capacity was found to be just below slightly limiting. In Milton Keynes this can be explained by the fact that the Refill project is not yet implemented in the city. This also led to the slightly limiting governance capacity to address the challenge of water consumption. However in Sabadell, there are several components that limit the capacity to govern practices of water recycling in the city. For instance, existing national and regional norms and regulations regarding water quality limit the application of treated wastewater for non-potable purposes. The limited coordination between the national and local government in Sabadell was found to limit the governance capacity to implement the reuse of treated wastewater. Lastly, the governance capacity of Jerusalem was also found to be slightly limiting to address the challenge of water conservation. For instance, Jerusalem scores low on the dimension 'stakeholder engagement process'. There is limited citizen engagement during policy creation, and stakeholders´ core values are not always taken into account. To foster citizen engagement in Jerusalem but also in other cities where engagement is limited, the DSP can play a crucial role as the platform can facilitate a dialogue between a variety of stakeholders.

Table 8 A comparison of governance capacities to address the water challenges in Leicester, Milton Keynes, Sabadell and Jerusalem. Scores range from very encouraging (++) too very limiting (--) the overall capacity to govern water challenges

Dimension	Indicator	Leicester	Milton Keynes	Sabadell	Jerusalem
Knowing	1.1 Community knowledge	0	+	0	0
	1.2 Local sense of urgency	+	0	0	0
	1.3 Behavioural internalization	+	0	+	0
	2.1 Information availability	+	0	0	+
	2.2 Information transparency	+	+	0	+
	2.3 Knowledge cohesion	+	0	0	0
	3.1 Smart monitoring	+	0	0	+
	3.2 Evaluation	+	-	-	0
	3.3 Cross-stakeholder learning	+	0	0	0
Wanting	4.1 Stakeholder inclusiveness	0	-	0	-
	4.2 Protection of core values	0	0	0	--
	4.3 Progress and variety of options	0	-	0	-
	5.1 Ambitious and realistic goals	+	0	+	+
	5.2 Discourse embedding	0	0	0	-
	5.3 Policy cohesion	0	0	-	-
	6.1 Entrepreneurial agents	0	0	-	+
	6.2 Collaborative agents	0	0	0	-
	6.3 Visionary agents	+	0	0	0

Enabling	7.1 Room to manoeuvre	0	0	+	0
	7.2 Clear division of responsibilities	0	0	0	0
	7.3 Authority	0	0	0	+
	8.1 Affordability	+	0	0	-
	8.2 Consumer willingness to pay	0	0	0	-
	8.3 Financial continuation	0	-	0	+
	9.1 Policy instruments	0	0	+	-
	9.2 Statutory compliance	+	0	0	0
	9.3 Preparedness	+	0	0	+

7.3 Experiences with collaborative learning in the KDCs

In the following section, two sub-questions are answered: (1) *Is there a process of collaborative learning and information sharing between citizens and local authorities with the focus on co-production of knowledge and trust?,* and (2) *In what way do social, economic, cultural, political and technical conditions influence the capacity of citizens to participate in a) information sharing, and b) knowledge co-production in a particular area and issue?*

In the four demonstration cities, experiences with collaborative learning were examined based on the characteristics of the collective setting, the collaborative learning process and products. In all of the KDCs a collaborative learning process was identified, where information was acquired, translated and disseminated. In all of the cities, information was shared between governmental bodies, citizens and institutions. However, in some cities the degree of information sharing was more extensive. For instance, in a city as Jerusalem there is a network between community gardens, the municipality, NGOs and the local water company. Knowledge about water conservation in community gardens is widely shared between these stakeholders, whereas in a city like Milton Keynes knowledge sharing on Refill is limited, although this can be explained as the Refill project is not yet implemented in the city. The DSP is used in all cities as a platform to share information between citizens and local authorities, which could further enable the co-production of knowledge and trust.

In all of the four KDCs, conditions can be identified which influence the capacity of citizens to participate in information sharing and knowledge production. For example, the reuse of treated wastewater for non-potable purposes is not widely accepted in the centralised water governance system in Spain. Existing evaluation of water recycling practices are mostly irregular, fragmented, and impede the development of a cohesive legislative, institutional and management framework to support water recycling. This incoherence also hampers the freedom for entrepreneurs and other actors to enter the local network of organisations that are involved in the recycling of treated wastewater. The coordination between the national government and the local authority in Sabadell can thus be improved, which could also enhance the capacity of entrepreneurs and other stakeholders to participate in knowledge co-production.

7.4 Key characteristics of the DSP in the KDCs

In this section, the sub-question '*What are the key characteristics of the digital social platforms in the KDCs?*' is discussed.

The DSP focuses on a specific water challenge in each of the KDCs, respectively flood risk in Leicester, water consumption in Milton Keynes, water quality and non-potable water reuse in Sabadell, and water conservation in Jerusalem. In each of these cities, the DSP has similar objectives such as to raise awareness and increase knowledge of citizens on the specific water challenge. To raise awareness and increase knowledge on the water challenge at hand, users can browse through information on the DSP. After browsing the information that is provided on the DSP, users can leave comments and discuss with each other about the water challenge. Furthermore, users can like other comments or share the comments on their social media pages. However, users first need to register to the platform before they can actively engage on the platform. In addition to the online platform, there is an emphasis on offline activities, such as events and workshops which are aligned with the objectives of the DSP (see Deliverable 3.5 for the POWER engagement model, which includes an extensive explanation of these activities).

Gamification techniques are incorporated into the DSP to provide additional motivation drivers and incentives to help increase user interaction with the DSP attempting to raise awareness with the water challenge. An important element of the gamification model is the point mechanism that uses points to reflect the extent to which a given action contributes to increasing preparedness and real-world impact on an individual, social and political level. When users are registered to the platform they can see how much progress is made on different dimensions related to the water challenge, including problem awareness, know-how and readiness to act. The progress is reflected in the number of points one received, for instance by leaving a comment or reading an information page. The gamified incentives motivate various types of users, support multiple perspectives and allows to reach common goals (see Deliverable 3.4 for the report on the gamification model used within the POWER DSPs). In addition to this, users were able to join the idea contest on the DSP in all KDCs. The contest is an innovative participatory method that helps cities engage their citizens with sustainability topics and develop innovative ideas. Through a co-creative approach, innovative ideas are developed to better address the water challenges in the KDCs. Besides online participation, there are also design workshops organised which enable any citizen to effectively create ideas in a short session.

7.5   Potentials and barriers in the practical application of the DSPs

In this section, the sub-question '*what potentials and barriers can be identified in the practical application of the DSPs'* is answered.

The POWER DSP has been developed as a tool for citizen engagement and to facilitate new forms of knowledge sharing and communication. DSPs may have the potential to be useful in enhancing collaborative learning, provided that they are well embedded in the local governance context and address the specific governance issues at hand. The emergence of information and communication technologies including DSPs may have provoked a shift in the way people interact between them and their environment. The availability of information along with the capacity to store and disseminate it, opened new means for social, political and scientific innovation. However, it creates new social demands such as more transparency and public access to data. The DSPs have the potential to increase legitimacy and promote trust by creating more transparency and making reliable information more accessible to citizens.

Moreover, our findings indicate that the DSP has a high potential in awareness raising and knowledge exchange. The platform allows a large number of citizens to be better informed and co-produce water services with the local government. DSPs also have the potential to contribute to enhance public participation by lowering the transaction costs and bring transparency in the water governance debate, and by bringing reliable information to all stakeholders. Policy entrepreneurship is needed to effectively promote the creation of a public debate on water governance and include the DSP within the public participation mechanism. This entrepreneurship needs to involve more partners to bring content to the DSP to ensure its

plurality and legitimacy. This diversity of stakeholders should not only include decision-makers such as the government but also experts, researchers and citizens.

In some of the KDCs there are already online platforms available to address the water challenges analysed in this study. An example is the Facebook page for community garden activists in Jerusalem, which contains a wide variety of information on community gardening as well as the possibility to share knowledge and experiences. It is therefore very important that the DSPs are aligned with existing citizen engagement initiatives. This could also lead to an increase in outreach, avoid competition with alternative initiatives for public debates, and ensure that the opinions and feedback that has been given through the DSP are capable to influence the decision-making process on water governance.

If citizens do not experience an imminent threat from the water challenge, they tend to be less willing to use the DSP. To tackle this, gamification elements are integrated into the DSP to persuade people to use the platform and learn about the water challenge. Although users of the DSP can earn points by engaging and getting informed about water challenges on the DSP no material rewards are given to stakeholders that have collected points. Thus, more non-digital positive reinforcement could be fostered by giving tangible rewards when a certain number of points is collected by users as a way to increase the number of visitors on the website. However, it should be examined to what extent these tangible rewards are more effective than digital rewards. However, users of the DSP were able to join an idea contest. The contest is a participatory method that helps cities engage their citizens with sustainability topics and develop innovative ideas. Through a co-creative approach, innovative ideas were developed to better address the water challenges. Besides online participation, design workshops were also organised which enabled any citizen to effectively create ideas in a short session. This idea contest did have a reward, since the users that collect the most points were invited to the final conference of the POWER project to share their idea in public.

DSPs have a high potential to enable more inclusive and effective citizen engagement in water issues in cities throughout Europe and beyond as the examples in the KDCs have demonstrated. As discussed in previous sections, the DSP can fulfil all four types of interaction as presented by Mukhtarov et al. (2018). However, much also depend on how the DSP is being applied. Wesselink et al. (2015) argue that ICT tools do not deterministically empower public participation. This conclusion is in line with the arguments of Fung et al. (2013) that argues that democratisation and public participation are political issues that cannot be triggered only by means of implementing ICT tools. Overall, we observe that DSPs could help improve effectiveness and efficiency in urban water governance while opening up opportunities for citizens to co-produce knowledge and services with the government.

7.6   Recommendations to enhance the DSP to ensure effective citizen engagement

In this section, the sub-question '*how can the DSP be enhanced in order to ensure effective citizen engagement in the KDCs and beyond'* is answered. In the preceding section we examined the potential of the DSP. The online platform enables a variety of stakeholders to acquire and share knowledge and experiences on water challenges. DSPs have high potential to enable more inclusive and effective citizen engagement in water issues in cities if certain conditions are met. These conditions are necessary to realise the full potential and optimal use of the DSP. The following set of conditions are required to effectively implement the DSP in cities throughout Europe and beyond:

1. There should be a specific **water challenge** and a local **sense of urgency**. This has been proven to be key in this study for a successful implementation of the DSP, if there is no sense of urgency on the specific water challenge, it is difficult to attract stakeholders to the DSP;

2. The DSP should be **aligned** with existing citizen engagement initiatives and should be **embedded** in a wider strategy on the local level. The alignment with existing citizen engagement initiatives could lead to an increase in outreach, avoid competition with other initiatives, and ensure that the opinions and feedback that have been given through the DSP are capable of influencing the decision-making process on water governance;

3. Stakeholders should be addressed in an **effective** manner. Different stakeholders have different expertise, knowledge, needs, motivations, attitudes, digital skills and time to dedicate to the process. It is therefore essential to understand the characteristics of different stakeholders, and how to effectively address their needs. Furthermore, to create a dialogue it is important to **encourage a conversation** and create **engaging content** that aligns with the needs of the stakeholders;

4. There should be a **moderator** who is responsible for the implementation and maintenance of the platform, and who ensures that the content remains productive and apolitical. It is therefore important that ethical **guidelines** are created which foster meaningful knowledge sharing. In the KDCs the councils are the moderators, but in future applications also other actors can be responsible for moderating the DSP. Furthermore, a distinction can be made between moderators and content providers. Content providers should include a wide range of stakeholders, to ensure representativeness of the community ;

5. The DSP communicates information to relevant stakeholders to raise awareness and increase the knowledge of the water challenge. It is therefore of significant importance that the **information** provided on the platform is **reliable, transparent and comprehensible.** For instance, information that is provided about water conservation should be based on literature (while keeping in mind that the information in comprehensible for all stakeholders, and thus not written in academic language). Whereas flood risk maps should be based on information that is made available by relevant (governmental or research) institutions;

6. The DSP has been developed to be a tool for citizen engagement and to facilitate new forms of knowledge sharing and communication. Currently, users can only share knowledge and experiences if they are registered to the platform. If the DSP is only meant for sharing of knowledge and experiences registration is not necessary. In that case the DSO must have an **open access (**see also comment 10**);**

7. An important subject of public participation is the **ability** of citizens to **utilise** DSPs and have appropriate levels of connection and equipment in order to engage in governance. With more emphasis on digitalisation, a potential "digital divide" between the rich and poor requires should be emphasised (Mukhtarov et al., 2018).

Our four case studies reveal that DSPs have high potential to ensure effective citizen engagement if the previously mentioned conditions for an optimal use of the DSPs are present. Potential DSP adopters have to take these into account. We therefore conclude with the following recommendations:

7. **Ensure enough political and social support before developing the DSP:** ideally the specific water challenge is a hot topic on both the political and social agenda. If the challenge is not high on the political and/or social agenda, it is recommended that DSP adopters respond to windows of opportunities. Recent flood events could for instance provide an opportunity to raise awareness on flood risk. The DSP can also play a role in this by putting the water challenge at the forefront. The DSP of Leicester for example revolves around the challenge of flood risk, and is used as a tool to communicate and prepare stakeholders on flooding;

8. **Map existing policies:** examine ongoing and recent policies on the specific water challenge in order to find out what has already been done by other actors to address the water issue at the national, regional and local level; the DSP must be embedded in these policies;

9. **Continuously map knowledge gap and needs:** The POWER project has identified knowledge gaps, for example through the knowledge mobilization workshops (see Deliverable 4.3). However, continuous investigation of what knowledge stakeholders have and what knowledge needs stakeholders have. If a variety of stakeholders are involved, knowledge needs could differ. It is therefore important to put relevant information on the DSP, which has an added value both from the perspective of fulfilling the needs of stakeholders as well as filling the knowledge gap. Furthermore, information on the DSP must be easy to find for stakeholders (e.g. on Google, by using relevant key words);

10. **Create a clear objective for the DSP:** there should be a clear aim for the usage of the DSP as this determines the extent to which the platform is open access. As a starting point it is recommended that all information on the DSP is accessible for everyone, however when the aim is to provoke a discussion on the water challenge registrations could be relevant (e.g. for gamification elements and the planning of offline debates);

11. **Ensure reliability, transparency and comprehensibility:** to ensure that information that is communicated on the DSP is reliable, transparent and comprehensible there should be an editorial team. There should be an ethical guideline to ensure that content is productive and meaningful. Ethical guidelines can be used that are available on other online platforms (e.g. Facebook). The editorial team should regularly check whether the content on the DSP meets these guidelines;

12. **Reflect on representativeness:** critically reflect on the stakeholders that are active on the DSP and whether they are representative for a whole community. As the DSP aims to be a tool for democratic participation, it should be examined whether this is also the case in practice (e.g. if the information that is communicated fulfils the needs of all stakeholder groups and whether the comments placed on the DSP are representative for these groups). Although the DSP can be a tool to communicate information and evoke discussions, it is not a replacement of council meetings.

To conclude, it should be kept in mind that the DSP is a tool to enrich decision-making processes. DSPs however are not a panacea.

References

ACRI. (2017). East-Jerusalem: Facts and Figures 2017. Retrieved on September 5, 2018, from https://www.acri.org.il/en/wp-content/uploads/2017/05/Facts-and-Figures-2017.pdf

ACRI. (n.d.). Application for interim order and immediate scheduling of hearing. Retrieved on August 31, 2018, from https://www.acri.org.il/en/wp-content/uploads/2014/04/East-Jerusalem-Water-Petition-English.pdf

Aigues Sabadell. (2016). *Memòria desenvolupament sostenible 2016*. Sabadell, Aigues Sabadell.

Ajuntament de Sabadell. (2016). *Reutilització directa i indirecta. sistemes de reutilització a escala de macroconsum i microconsum* Retrieved on August 25, 2018,from http://xarxaenxarxa.diba.cat/sites/xarxaenxarxa.diba.cat/files/2_sabadell_0.pdf

Ajuntament de Sabadell, & Aigues de Sabadell. (2017). Pla director d'abastament d'aigua potable de Sabadell. Retrieved on August 23, 2018, from http://ca.sabadell.cat/MediAmbient/d/Presentaci%C3%B3%20PD.pdf

Ajuntament de Sabadell. (2018). *Anunci de la creació de la taula de l'aigua*. Sabadell: Diputació de Barcelona. Retrieved on August 23, 2018, from http://ca.sabadell.cat/Aigua/d/anunciBOPBTaulaAigua.pdf

Alexander, M., Priest, S., & Mees, H. (2016). A framework for evaluating flood risk governance. *Environmental Science & Policy*, *64*, 38-47.

Anglian Water. (2018). Our company. Retrieved on November 6, 2018, from https://www.anglianwater.co.uk/about-us/our-company.aspx

Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of public administration research and theory*, *18*(4), 543-571.

Aquarius Spectrum. (n.d.). Case studies. Retrieved on September 5, 2018, from http://www.aquarius-spectrum.com/case-studies.html

Arad. (2018). Octave. Retrieved on September 5, 2018, from https://arad.co.il/assets/Octave-V4-02-July-2018-B.pdf

Argyris, C. & Schon, D.A. (1996). *Organizational learning II. Theory, method, and practice*. Reading: Addison-Wesley.

Barkham, P. (2016). Story of cities #34: the struggle for the soul of Milton Keynes. Retrieved on November 19, 2019, from https://www.theguardian.com/cities/2016/may/03/struggle-for-the-soul-of-milton-keynes

Barrett, G., & Wallace, M. (2011). An Institutional Economics Perspective: The Impact of Water Provider

Privatisation on Water Conservation in England and Australia. *Water Resources Management*, *25*(5), 1325–1340.

BBC. (2019). Plastic bag sales in England halved in past year. Retrieved August 27, 2019, from https://www.bbc.com/news/uk-politics-49185007

Begg, C., Walker, G. & Kuhlicke, C. (2015). Localism and flood risk management in England: the creation of new inequalities? *Environment and Planning C: Government and Policy*, *33*, 685 –702.

Benson, D., Lorenzoni, I. & Cook, H. (2016). Evaluating social learning in England flood risk management: an 'individual-community interaction' perspective. *Environmental Science & Policy*, *55*, 326-334.

Caprotti, F. & Cowley, R. (2016). UK Smart Cities Survey 2016. London: King's College London.

CASSA. (2017). Aigües Sabadell assisteix a les reunions de comunitats de veïns i veïnes per resoldre dubtes sobre el servei d'aigües. Retrieved on August 28, 2018, from http://www.aiguessabadell.cat/aigues-sabadell-assisteix-a-les-reunions-de-comunitats-de-veins-i-veines-per-resoldre-dubtes-sobre-el-servei-daigues/

Catchment Based Approach. (2017). Catchment Based Approach: About. Retrieved on September 13, 2017, from http://www.catchmentbasedapproach.org/about

Centre for Social Innovation. (2017). Understanding provision, usage and perceptions of free drinking water to the public in the UK. Retrieved on September 23, 2018, from http://www.keepbritaintidy.org/sites/default/files/resources/KBT_CFSI_BRITA_Water_Water_ Everywhere_2017.pdf

CIRIA. (2018). The SuDS Manual (C753). Retrieved on February 21, 2019, from https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

City to Sea. (n.d.). Help stop plastic pollution at source! Retrieved on October 28, 2018, from https://www.citytosea.org.uk

Curapipe. (n.d.). TALR. Retrieved on August 31, 2018, from https://www.curapipe.com/talr

Dawes, S. S., Cresswell, A. M. & Pardo, T. A. (2009). From "Need to Know" to "Need to Share": Tangled Problems, Information Boundaries, and the Building of Public Sector Knowledge Networks. *Public Administration Review*, *69*(3), 392-402.

DEFRA. (2004). *Making Space for Water: Developing a new Government Strategy for Flood and Coastal Erosion Risk Management in England: A Consultation Exercise*. London: DEFRA.

DEFRA. (2005). *Making Space for Water: Taking Forward a New Government Strategy for Flood and Coastal Erosion Risk Management in England: First Government Response to the Autumn 2004 Making Space for Water Consultation Exercise*. London: DEFRA.

DEFRA. (2014). Action taken by Government to encourage the conservation of water: Progress report to Parliament on the steps taken to encourage the conservation of water as required by Section 81 of the Water Act 2003. Retrieved on September 23, 2018, from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/308019/pb1 4117-water-conservation-action-by-government.pdf

DEFRA. (2018). A Green Future: Our 25 Year Plan to Improve the Environment. London: DEFRA.

Dengler, M. (2007). Spaces of power for action: Governance of the Everglades restudy process (1992–2000). *Political Geography*, *26*(4), 423-454.

DFID. (2003). Department for International Development: Tools for Development. A Handbook for Those Engaged in Development Activities; DFID: London, UK.

Dieperink, C., Green, C., Hegger, D. L. T., Driessen, P. P. J., Bakker, M. H., Rijswick, H. F. M. W., … & Ek, K. (2013). *Flood Risk Management in Europe: an Exploration of Governance Challenges*. STAR-FLOOD Consortium.

Dolowitz, D. P., Bell, S. & Keeley, M. (2018). Retrofitting urban drainage infrastructure: green or grey?. *Urban Water Journal*, *15*(1), 83-91.

EFBW. (2016). Key statistics. Retrieved on July 12, 2018, from https://www.efbw.org/index.php?id=90#united-kingdom

Emerson, K., Nabatchi, T. & Balogh, S. (2012). An integrative framework for collaborative governance. *Journal of Public Administration Research and Theory*, *22*(1), 1–29.

EMS Mekorot Projects (n.d.). The fifth water system to Jerusalem. Retrieved on August 31, 2018, from http://www.emsmekorotprojects.com/?CategoryID=301

Environment Agency. (2014). Flood and coastal erosian risk management: Long-term investment scenarios. Retrieved on September 14, 2017, from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/381939/FCRM_Long_term_investment_scenarios.pdf

Environment Agency. (2016). Leicester Integrated Flood Risk Management Strategy - Strategic Environmental Assessment (SEA) Scoping Report. Retrieved on September 13, 2017, from https://consult.environment-agency.gov.uk/east-midlands/leicester-flood-risk-management-strategy/supporting_documents/Leicester%20Integrated%20Flood%20Risk%20Management%20Strategy%20SEA%20Scoping%20report.pdf

Environment Agency. (2017a). Flood information service. Retrieved on September 14, 2017, from https://flood-warning-information.service.gov.uk/

Environment Agency. (2017b). Flood map for planning. Retrieved on September 14, 2017, from https://flood-map-for-planning.service.gov.uk/

Environmental Audit Committee. (2017). Plastic bottles: Turning Back the Plastic Tide. Retrieved on September, 3, 2018 from http://www.parliament.uk/.%0Ahttp://www.parliament.uk/eacom

Erviti, M.C. & León, B. (2017). Climate Change Communication in Spain. *Oxford Research Encyclopedia of Climate Science*, 1–35.

European Commission. (2012). Flash Eurobarometer 344 – Attitudes of Europeans towards water related issues. Retrieved on September 5, 2018, from https://data.europa.eu/euodp/data/dataset/S1047_344

European Commission. (2018a). European strategy for plastics. Retrieved on October 29, 2018, from http://ec.europa.eu/environment/waste/plastic_waste.htm

European Commission. (2018b). Single-use plastics: New EU rules to reduce marine litter. Retrieved on October 29, 2018, from http://europa.eu/rapid/press-release_IP-18-3927_en.htm

Ferris, J., Norman, C. & Sempik, J. (2002). People, land and sustainability: community gardens and the social dimension of sustainable development. *Social Policy & Administration, 35*(5).

Filkobski, I., Rofé, Y. & Tal, A. (2016). Community gardens in Israel: characteristics and perceived functions. *Urban Forestry & Urban Greening, 17*, 148-157.

Flood RE. (2017). Flood Re is helping to provide affordable home insurance. Retrieved on September 14, 2017, from https://www.floodre.co.uk/

Fogg, N. (2018). Will Northamptonshire be the last council to go bankrupt? We've crunched the numbers. Retrieved on August 20, 2018, from https://www.citymetric.com/politics/willnorthamptonshire-be-last-council-go-bankrupt-we-ve-crunched-numbers-3773

Fung, A., Russon Gilman, H., & Shkabatur, J. (2013). Six models for the internet + politics. *International Studies Review*, *15*(1), 30-47.

Gerlak, A.K. & Heikkila, T. (2011). Building a theory of learning in collaboratives: evidence from the Everglades restoration program. *Journal of Public Administration Research and Theory, 21*(4), 619-644.

Hagihon. (2017). Environmental report 2017. Retrieved on September, 5, 2018, from https://www.hagihon.co.il/SystemFiles/19633.pdf

Hagihon. (2018a). Water Quality Monitoring. Presentation.

Hagihon. (2018b). Water tariff. Retrieved on August, 23, 2018, from https://www.hagihon.co.il/SystemFiles/taarif_7_2018.pdf

Hagihon. (2018c). Implementing Innovative Technologies. Presentation.

D4.8 Report on the UWCS governance analyses of the Key   **POWER**
Demonstration Cities
30-11-2019   687809

Hagihon. (n.d.). Annual reports. Retrieved on August 23, 2018, from https://www.hagihon.co.il/FileDownloads/?nodeId=981

Hagihon. (n.d.). About us. Retrieved on January 4, 2019, from https://www.hagihon.co.il/RichText/GeneralPage.aspx?nodeId=1202

Hagihon. (n.d.). Homat Schmuel plant. Retrieved on January 27, 2019, from https://www.hagihon.co.il/Branches/Branch.aspx?nodeId=1349&branchId=833

Hawkins, G. (2009). The Politics of Bottled Water. *Journal of Cultural Economy, 2*(1–2), 183–195.

Heikkila, T. & Gerlak, A.K. (2013). Building a conceptual approach to collective learning: lessons for public policy scholars. *Policy Studies Journal, 41*(3).

Holt, D. B. (2012). Constructing Sustainable Consumption: From Ethical Values to the Cultural Transformation of Unsustainable Markets. *The Annals of the American Academy of Political and Social Science*, *644*(1), 236–255.

IEEE. (2017). Institute of Electrical and Electronics Engineers: IEEE Affiliated Smart City Profile – Sabadell, Spain. Retrieved on September, 13, 2017, from http://smartcities.ieee.org/affiliated-cities/sabadell-spain.html

Ir Amim. (2015). Displaced in their own city. Retrieved on 23 August, 2018, from http://www.ir-amim.org.il/sites/default/files/akurim_ENG_for%20web_0.pdf

Israeli Government. (n.d.). Water saving. Retrieved on August 23, 2018, from http://www.water.gov.il/Hebrew/Water-saving/Pages/default.aspx

IWA. (n.d.). Cities of the future. Retrieved November 13, 2019, from https://iwa-network.org/programs/cities-of-the-future/

IWA. (2011). The State of Israel: National Water Efficiency Report. Retrieved August, 23, 2018 http://www.water.gov.il/Hebrew/ProfessionalInfoAndData/2012/24-The-State-of-Israel-National-Water-Efficiency-Report.pdf

IWA. (2012). Long-term Master Plan for the National Water Sector. Retrieved on August, 23, 2018 from http://www.water.gov.il/Hebrew/Planning-and-Development/Planning/MasterPlan/DocLib4/MasterPlan-en-v.4.pdf

Jaffee, D., & Newman, S. (2013). A More Perfect Commodity: Bottled Water, Global Accumulation, and Local Contestation. *Rural Sociology, 78*(1), 1–28.

Keep Britain Tidy. (n.d.). We have the (reusable) bottle but we don't use it! Retrieved October 15, 2018, from http://www.keepbritaintidy.org/we-have-reusable-bottle-we-don%E2%80%99t-use-it

Koop, S.H.A., Van Dorssen, A.J.,Brouwer, S. (2019) Enhancing domestic water conservation behaviour: A review of empirical studies on influencing tactics. *Journal of environmental management,* 247, 867-876

Koop, S., Monteiro Gomes, F., Schoot, L., Dieperink, C., Driessen, P., Van Leeuwen, K. (2018) Assessing the capacity to govern flood risk in cities and the role of contextual factors. *Sustainability*, 10, 2869.

Koop, S.H.A. Koetsier, L., Doornhof, A., Reinstra, O., Van Leeuwen, C.J., Brouwer, S., Dieperink, C., Driessen, P.P.J. (2017) Assessing the governance capacity of cities to address challenges of water, waste, and climate change. *Water Resources Management*, 31, 3427-3443.

Lange, P., Driessen, P.P.J., Sauer, A., Bornemann, B., Burger, P. (2013). Governing towards sustainability conceptualizing modes of governance. *Journal of Environmental Policy & Planning*, *15*, 403–425.

LCC. (2011). Preliminary Flood Risk Assessment Retrieved September 13, 2017, from . https://www.leicester.gov.uk/media/178227/leicester-city-pfra-september-2011.pdf

LCC. (2012a). Strategic Flood Risk Assessment. URS Environment and Infrastructure. Retrieved on September 13, 2017, from https://www.leicester.gov.uk/media/178231/leicester-l2-sfra-final-report-2012.pdf

LCC. (2012b). Surface Water Management Plan. Retrieved September 14, 2017, from https://www.leicester.gov.uk/media/178251/swmp-main-report.pdf

LCC. (2014). Leicester City Core Strategy. Retrieved on September 14, 2017, from https://www.leicester.gov.uk/media/182519/local-development-framwork-core-strategy-adopted-2014.pdf

LCC. (2015a). Climate Change Adaptation Plan (p. 15) Leicester. Retrieved on September 14, 2017, from http://publications.leicester.gov.uk/adaptationplan/files/assets/common/downloads/Climate%20change%20adaptation%20plan%20April%202015.pdf

LCC. (2015b). Leicester Local Flood Risk Management Strategy (p. 9). Leicester. Retrieved on September 13, 2017, from http://www.leicester.gov.uk/your-environment/flooding-and-severe-weather/local-flood-risk-management-strategy/

LCC. (2015c). Sustainable Drainage Guidance. Retrieved on September 14, 2017, from https://www.leicester.gov.uk/media/179759/suds-guidance-april-2015.pdf

LCC. (2015d). Leicester Green Infrastructure Strategy 2015-2025: Evidence Base, Actions and Opportunities. Retrieved on July 17, 2018, from https://www.leicester.gov.uk/media/183734/leicesters-green-infrastructure-strategy-2015-2025.pdf

LCC. (2017). Ways to manage the flood risk. Retrieved September 14, 2017, from https://www.leicester.gov.uk/your-environment/flooding-and-severe-weather/ways-to-manage-the-flood-risk/

Linders, D. (2012). From e-government to we-government: defining a typology for citizen coproduction in the age of social media. *Government Information Quarterly, 29*(4), 446-454.

Lipshitz, R., Popper, M., & Friedman, V. J. (2002). A multifacet model of organizational learning. *The journal of applied behavioural science*, *38*(1), 78-98

Local Government Association. (2018a). What is devolution? Retrieved November 15, 2018, from https://www.local.gov.uk/topics/devolution/what-devolution

Local Government Association. (2018b). Local services face further £1.3 billion government funding cut in 2019/20. Retrieved November 15, 2018, from https://www.local.gov.uk/about/news/local-services-face-further-ps13-billion-government-funding-cut-201920

Mekorot. (n.d.). Jerusalem's Fifth System. Retrieved August 31, 2018, from http://www.mekorot.co.il/Eng/newsite/Solutions/SustainableDevelopment/Pages/SustainableDevelopmentTheFifthSystem.aspx

Milton Keynes Council. (n.d.). Waste & Recycling. Retrieved November 8, 2018, from https://www.milton-keynes.gov.uk/waste-recycling

Mukhtarov, F., Dieperink, C. & Driessen, P.P.J. (2018). The influence of information and communication technologies on public participation in urban water governance: a review of place-based research. *Environmental Science and Policy, 89,* 430-438.

Muro, M. & Jeffrey, P. (2012). Time to talk? How the structure of dialog processes shapes stakeholder learning in participatory water resources management. *Ecology and Society*, *17*(1), 3.

National Audit Office. (2018). Financial sustainability of local authorities 2018. Ministry of Housing, Communities & Local Government (Vol. HC834). Retrieved on October 23, 2018, from https://www.nao.org.uk/wpcontent/uploads/2018/03/Financial-sustainabilty-of-local-authorites-2018.pdf

Newig, J., Challies, E., Jager, N. W., Kochskaemper, E. & Adzersen, A. (2017). The environmental performance of participatory and collaborative governance: a framework of causal mechanisms. *Policy Studies Journal*, *46*(2)

Office for National Statistics. (2016). Subnational Population Projections, Local Authorities in England: SNPP Z1 - Office for National Statistics. Retrieved on September 13, 2017, from https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandz1

Ofwat. (n.d.). Water sector overview. Retrieved on August 26, 2018, from https://www.ofwat.gov.uk/regulated-companies/ofwat-industry-overview/

Ohlsson, S. (2011). *Deep learning: How the mind overrides experience*. Cambridge: Cambridge University Press.

Qlik. (n.d.). Products. Retrieved on August 25, 2018, from https://www.qlik.com/us/products/qlikview

Owen, D. A. L. (2018). *Smart water technologies and techniques: data capture and analysis for sustainable water management*. Oxford: John Wiley & Sons.

Pahl-Wostl, C. (2009). A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, *19*(3), 354-365.

Palen, L. & Liu, S.B. (2007). Citizen communications in crisis: anticipating a future of ICT-supported public participation. *CHI Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* 727-736.

Penning-Rowsell, E. & Pardoe, J. (2014). The distributional consequences of future flood risk management in England and Wales. *Environment and Planning C: Politics and Space*, *33,* 1301-1321.

Pitt review, M. (2008). *Learning Lessons from the 2007 Floods: Final Report*. London: Independent Review.

POWER. (2017). New Digital Social Platform for water related issues is online! Retrieved August 28, 2018, from https://www.power-h2020.eu/2017/10/13/new-digital-social-platform-waterrelated-issues-online/

POWER. (2018). Non-potable water, contracting and exportation, ask for it! Retrieved on September, 10, 2018, from https://sabadell.power-h2020.eu/

Pozniak, H. (2018). The blue planet effect: why marine biology courses are booming. Retrieved on September 28, 2018, from https://www.theguardian.com/education/2018/jan/12/blue-planet-effect-why-marine-biology-courses-booming

Refill. (n.d.). A grassroots movement. Retrieved November 20, 2019, from https://refill.org.uk/about/

Revell, K. (2013). Promoting sustainability and pro-environmental behaviour through local government programmes: examples from London, UK. *Journal of Integrative Environmental Sciences*, *10*(3-4), 199-218.

Ribas i Palom, A., & Saurí i Pujol, D. (2010). 2008, l'any de la sequera. Retrieved on August 23, 2018, from http://territori.scot.cat/cat/notices/2010/10/2008_l_rsquo_any_de_la_sequera_2729.php

River Soar Catchment Partnership. (2017). Soar Catchment Management Plan. Retrieved on September 13, 2017, from http://www.trentriverstrust.org/site/sites/default/files/Soar%20Catchment%20Management%20Plan%20March%202017.pdf

Rodwin, L., & Schön, D. A. (1994). *Rethinking the Development Experience: Essays provoked by the work of Albert O. Hirschman*. Brookings Institution Press.

Russell, S., & Hampton, G. (2006). Challenges in understanding public responses and providing effective public consultation on water reuse. *Desalination, 187*(1), 215-227.

Sedley, D. (2018). 'Israel is drying out again': Water Authority relaunches conservation campaign. Retrieved

on January 6, 2019, from https://www.timesofisrael.com/israel-is-drying-out-again-water-authority-relaunches-conservation-campaign/

TaKaDu. (n.d.). About us. Retrieved August 23, 2018, from http://www.takadu.com/about-us

Teschner N., McDonald A., Foxon T.J. & Paavola, J. (2012). Integrated transitions toward sustainability: The case of water and energy policies in Israel. *Technological Forecasting and Social Change*, *79*(3), 457-468.

Thompson, R.C. (2017). Future of the Sea: Plastic Pollution. London: Government Office for Science.

Transition Town Milton Keynes. (n.d.). About Us. Retrieved October 29, 2018, from https://transitionmk.blogspot.com/p/what-is-transition.html

Trent Rivers Trust. (2017a). River Soar Community Project. Retrieved on September 14, 2017, from http://www.trentriverstrust.org/site/Soar_Community_Project

Trent Rivers Trust. (2017b). Trent Rivers Trust. Retrieved on September 13, 2017, from http://www.trentriverstrust.org/site/

UK Government. (2010). Flood and Water Management Act 2010. Retrieved on July 17, 2018, from https://www.legislation.gov.uk/ukpga/2010/29/pdfs/ukpga_20100029_en.pdf

Vinyoles, J., Quirante, R., & Fos, M. A. (2005). Los beneficios de la reutilización en el interior: El caso de Sabadell (The benefits of water reuse inland Catalonia: Sabadell case study). In *Technical Workshop: The integration of reclaimed water in water resource management.* Lloret de Mar: Consorci de la Costa Brava.

Vinyoles, J. & Quirante, R. (2010). Implantació de l'ús d'aigua no potable a Sabadell. Retrieved July 20, 2018, from https://docplayer.es/51683347-Implantacio-de-l-us-d-aigua-no-potable-a-sabadell.html

Walker, J. L. (1969). The diffusion of innovations among the American states. *American political science review*, *63*(3), 880-899.

Water Authority. (2011). The state of Israel: national water efficiency report. Retrieved August 31, 2018, from http://www.water.gov.il/hebrew/pages/water-authority-info.aspx?P=print

Water-Technology. (2017). Barcelona Sea water Desalination Plant. Retrieved on September 13, 2017, from http://www.water-technology.net/projects/barcelonadesalinatio/

Water-Technology. (n.d.). Sorek-Refa'im Sewage Treatment Plant. Retrieved on January 24, 2019, from https://www.water-technology.net/projects/sorek-treatment/

Water UK. (n.d.). Refill. Retrieved on September 23, 2018, from https://www.water.org.uk/news-campaigns/campaigns/refill/

Water UK. (2018a). National refill day. Retrieved on August 28, 2019, from https://www.water.org.uk/news-

item/national-refill-day/

Water UK. (2018b). New national drinking water scheme by water companies to cut plastic bottle use by millions. Retrieved on July 12, 2018, from https://www.water.org.uk/news-water-uk/latestnews/new-national-drinking-water-scheme-water-companies-cut-plastic-bottle-use

Wesselink, A., Hoppe, R., & Lemmens, R. (2015). Not just a tool. taking context into account in the development of a mobile app for rural water supply in Tanzania. *Water Alternatives*, *8*(2), 57-76.

WRAP. (n.d.). What is the UK Plastics Pact? Retrieved on November 6, 2018, from http://www.wrap.org.uk/content/the-uk-plastics-pact

Zenith Global. (2017). UK Water Drinks Report 2017. Retrieved August 6, 2018, from https://www.zenithglobal.com/reports_data/401/UK Water Drinks Report 2017

Annexes

Annex 1: Overview of publications

This deliverable consists of governance analyses of the four key demonstration cities, which have been previously published in peer-reviewed articles. An overview of these publications is provided in Box 9, structured along the chapters of this report.

Box 9: Overview of publications

Chapter 2: Analytical Framework

Koop SHA, Koetsier L, Van Doornhof A, Van Leeuwen CJ, Brouwer S, Dieperink C and Driessen PJ (2017) Assessing the governance capacity of cities to address challenges of water, waste, and climate change. *Water resources management*, *31,* 3427-3443. https://link.springer.com/article/10.1007/s11269-017-1677-7

Koop SHA, Brouwer S and Van Leeuwen K (2018) Assessing governance capacity in cities to address water challenges. Global Water Forum. http://www.globalwaterforum.org/2018/01/08/assessing-governance-capacity-to-address-water-challenges-in-cities/

Mukhtarov, F, Dieperink, C and Driessen, PPJ (2018) The Influence of Information and Communication Technologies on Public Participation in Urban Water Governance: A Review of Place-based Research. *Environmental Science and Policy*, *89,* 430-438. https://www.sciencedirect.com/science/article/pii/S146290111830368X

Den Boer, J. C. Dieperink and F. Mukhtarov, Social Learning in Multilevel Flood Risk Governance: Lessons from the Dutch Room for the River Program, Water 2019, 11(10), 2032; https://doi.org/10.3390/w11102032

Chapter 3: Leicester

Mukhtarov, F, Dieperink, C and Driessen, PPJ (2019) Collaborative learning for policy innovations: sustainable urban drainage systems in Leicester, United Kingdom. Journal of Environmental Policy & Planning*, 21*(3). https://doi.org/10.1080/1523908X.2019.1627864

Chapter 4: Milton Keynes

Koop SHA, Monteiro Gomes F, Schoot L, Dieperink C, Driessen PPJ and Van Leeuwen CJ (2018) Assessing the capacity to govern flood risk in cities and the role of contextual factors. Sustainability, 10: 2869. https://ideas.repec.org/a/gam/jsusta/v10y2018i8p2869-d163451.html

Chapter 5: Sabadell

Pinyol Alberich, J, Mukhtarov, F, Dieperink, C, Driessen PPJ & Broekman, A (2019) Upscaling urban recycled water schemes: an analyis of the presence of required governance conditions in the City of Sabadell (Spain). *Water, 11*(1). https://www.preprints.org/manuscript/201810.0427/v1

Steflova M, Koop SHA, Elelman R, Vinyoles J (2018) Governing Non-Potable Water Reuse to Alleviate Water Stress: the Case of Sabadell, Spain. *Water, 10:*739. https://www.mdpi.com/2073-4441/10/6/739

Chapter 6: Jerusalem

Witjes, M, Dieperink, C, Koop, SHA, Driessen PPJ (2019) Reflection on potential of ICT applications in urban water governance. *In preparation.*

Annex 2: Peer-reviewed publications of the Governance Capacity Analysis

Baseline governance capacity analyses have been conducted in a few follower cities in order to explore the governance barriers and opportunities in cities beyond the four KDCs in this project. This is key in fulfilling the overall aim of the POWER project in finding a broader application of DSPs as a tool to facilitate citizen engagement within EU water policy. The follower cities are examined in order to validate the governance capacity analyses methodological approach and thereby developing an effective diagnostic tool to explore the opportunities for DSPs beyond the cities directly involved in the POWER project. In total, the governance capacity has been analysed with respect to 42 water challenges in 15 cities across seven world continents and published into 9 peer-reviewed papers (Box 10).

Box 10: Peer-reviewed publications of the Governance Capacity Analysis

Aartsen M, Koop SHA, Hegger D, Goswami B, Oost J and Van Leeuwen CJ (2018) Connecting water science and policy in the Global South: Lessons from a systematic water governance assessment in the city of Ahmedabad, India. Regional Environmental Change 18:2445-2457 https://doi.org/10.1007/s10113-018-1363-1

Feingold D, Koop S and Van Leeuwen K (2017) The City Blueprint Approach: Urban Water Management and Governance in Cities in the U.S. Environmental Management. 61:9-23 https://www.ncbi.nlm.nih.gov/pubmed/29101426

Kim H, Son J, Lee S, Van Leeuwen CJ, Shin P and Jeryang Park (2018) Assessing urban water management sustainability of a megacity: case study of Seoul, South Korea. Water 10:682; https://doi.org/10.3390/w10060682

Koop S, Brouwer S and Van Leeuwen K (2018) Assessing governance capacity in cities to address water challenges. Global Water Forum http://www.globalwaterforum.org/2018/01/08/assessing-governance-capacity-to-address-water-challenges-in-cities/

Koop SHA, Monteiro Gomes F, Schoot L, Dieperink C, Driessen PPJ and Van Leeuwen CJ (2018) Assessing the capacity to govern flood risk in cities and the role of contextual factors. Sustainability, 10: 2869 https://ideas.repec.org/a/gam/jsusta/v10y2018i8p2869-d163451.html

Madonsela BT, Koop SHA, Van Leeuwen CJ and Carden KJ (2019) Evaluation of water governance process required to transition towards Water Sensitive Urban Design – An indicator assessment approach for the City of Cape Town. *Water, 11*, 292.

Rahmasary AN, Robert S, Chang IS, Jing W, Park J, Bluemling B, Koop SHA, Van Leeuwen CJ (2019) Overcoming the challenges of water, waste and climate change in Asian cities. *Environmental Management,* 1-16.

Schreurs E, Koop S and Van Leeuwen K (2017) Application of the City Blueprint Approach to assess the challenges of water management and governance in Quito (Ecuador). Environment, Development and Sustainability, 1-17 https://link.springer.com/article/10.1007/s10668-017-9916-x

Steflova M, Koop SHA, Elelman R, Vinyoles J (2018) Governing Non-Potable Water Reuse to Alleviate Water Stress: the Case of Sabadell, Spain. Water, 10:739 https://www.mdpi.com/2073-4441/10/6/739/htm

Annex 3: Overview of in-depth interviews Governance Capacity Analysis

Below the interviewees are provided for each Key Demonstration City. The interviewees are anonymised in order to protect the personal information and enable the interviewees to speak freely during the interviews. The full analyses, including the interviewees, consulted literature and justification of the indicator scores can be accessed on demand using the following link: http://beta.tools.watershare.eu/gca/$/

Jerusalem
- CEO Water Policy – Hagihon
- Director Water Infrastructure – Hagihon
- Director of Water Measurements – Hagihon
- Project leader: Checking NRW-loss –Hagihon
- Director Water Meter Reading and Billing – Milgam
- Billing department – Hagihon
- Director Water Quality laboratories – Hagihon
- Director Repair and maintenance of water infrastructure – Hagihon
- Director of the GIS-System – Hagihon
- Educational programs – Hagihon
- Operation Manager Har Homa Wastewater Treatment Plant – Mavti
- East-Jerusalem Planner – Bimkom
- Researcher – Ir Amim
- Community garden coordinator Jerusalem – Society for nature Protection is Israel
- Founder (and former deputy mayor) – Sustainability Lobby Jerusalem and Jerusalem Green Fund
- Former project leader – NewTech Program
- Community Gardens Agricultural Coordinator – Jerusalem Municipality
- Initiator Rainwater Harvesting in Schools
- Volunteer – Community Garden at Museum of Nature History
- Volunteer – Muslala Rooftop Garden

Leicester
- National Flood Risk Expert – De Montfort University
- Project Officer River Soar – Trent Rivers Trust
- Flood Risk Manager – Leicester City Council
- Flood Warden
- Councillor – Leicester City Council
- Resilience Management – Leicester City Council
- Resilience Management – Leicester City Council
- Resilience Management – Leicester City Council
- Flood Risk Expert – Consultant
- Flood Risk Management Advisor East-Midlands
- Landscape Planner – Leicester City Council
- Landscape Planner – Leicester City Council
- Landscape Planner – Leicester City Council
- Parks and Open spaces volunteer leaders – Leicester City Council
- Parks and Open spaces volunteer leaders - Leicester City Council

Milton Keynes
- Project manager sustainability department – Milton Keynes City Council

- Head of sustainability – Anglian Water
- Lecturer in water governance – Cranfield University
- Research fellow – University of Manchester
- Refill North West and Anglia regional coordinator – City to Sea
- Energy manager sustainability department – Milton Keynes City Council
- Refill Oxford volunteer – Georgina Matthews
- Local coordinator – Refill Colchester
- Senior planning officer – Milton Keynes City Council
- Local coordinator – Refill Norwich
- Town council member – Milton Keynes City Council
- Strategy consultant – Highways Agency
- Waterbody governance – Environment Agency
- Planning leader – Milton Keynes City Council
- Emergency planner – Milton Keynes City Council
- Director of operations – Internal Drainage Board

Sabadell
- Simbiosy
- Director of planning and projects - General Society Water of Barcelona (SGAB)
- Director - CONGIAC Consortium of the Integrated Water Management of Catalunya.
- Consultant - Sabadell's water treatment plant Riusec (EDAR RIUSEC)
- Professor - University of Barcelona
- Director of sustainable development - CASSA
- Environmental technician - Barcelona Provincial Government
- Researcher - Institute of Environmental Assessment & Water Research (IDÆA), CSIC
- Professor at Polytechnic University of Catalonia
- Director of the Catalan Water Agency
- Director of the department of sanitation and new uses - CASSA
- Head of supply and reuse - Consortium of the Costa Brava Technical Services
- Councillor Water Cycle, Sabadell City Council
- Director of operational area - CASSA
- Coordinator of public space - Sabadell City Council
- Environmental technician - Figueres

Annex 4: Overview of in-depth interviews Collaborative Learning

In total, 62 in-depth interviews have been conducted in the four key demonstration cities. Below the interviewees are provided for each city. The interviewees are anonymised in order to protect the personal information and enable the interviewees to speak freely during the interviews. The interviews were transcribed using the programme NVivo.

Leicester
- Councillor – Leicester City Council
- Planning officer – Leicester City Council
- Landscape – Leicester City Council
- Parks and Open spaces – Leicester City Council
- Senior Nature Conservation Officer – Leicester City Council
- Flood Risk Manager – Leicester City Council
- Community Engagement volunteer – Leicester City Council Parks and Open Spaces
- Research Fellow / Consultation – De Montfort University
- Professor / Consultation – Oxford and Middlesex
- Planning Officer – Leicester City Council
- Emergency Management – Leicestershire County Council and Resilience Forum
- PSO-SU Representative – Environment Agency
- Resilience Manager – Leicester City Council and Resilience Forum
- Officer on Engagement and the Project – Trent Rivers Trust: River Soar Catchment Partnership
- Severn Trent Water Expert – Severn Trent Water
- Independent Consultant on Drainage – Consultant who used to work for Environment Agency
- Citizen – Flood Wardens Leicester
- Citizen – Flood Wardens Leicester

Milton Keynes
- Project manager sustainability department – Milton Keynes City Council
- Head of sustainability – Anglian Water
- Lecturer in water governance – Cranfield University
- Research fellow – University of Manchester
- Refill North West and Anglia regional coordinator – City to Sea
- Energy manager sustainability department – Milton Keynes City Council
- Refill Oxford volunteer – Refill Oxford
- Local coordinator – Refill Colchester
- Senior planning officer – Milton Keynes City Council
- Local coordinator – Refill Norwich

Sabadell
- Expert – Gestió Integral d'Aigües de Catalunya (water management company)
- Expert – Agbar (water management company)
- Expert – UAB (water consumer)
- Expert – ACA (water authority)
- Expert – CREAF
- Activist – Observatori de l'aigua (NGO)
- Expert – Generalitat Catalunya (water authority)
- Journalist – iSabadell (local media)
- Activist – Aula de l'Aigua (NGO)

- Manager and businessman – Industrial park of Sant Pau de Riu Sec (water consumer)
- Director new uses – CASSA (water management company)
- Water consumer
- Expert – Ajuntament Sabadell (water authority)
- Expert – Ajuntament Sabadell (water authority)
- Communication expert – CASSA (water management company)
- Activist – Enginyers sense fronteres (NGO)
- Expert – CTM (research institution)
- Expert – Diputacío de Barcelona (water authority)
- Expert – ACA (water authority)
- Activist – PDE (NGO)
- Politician – Crida per Sabadell (local political party)

Two workshops:
- Three experts in water governance involved in the creation of Taula de l'aigua – Obervatori de l'aigua (NGO)
- Team of seven people with diverse backgrounds – CASSA (water management company)

Jerusalem
- Agricultural community garden coordinator – Jerusalem Municipality
- Coordinator of community gardens in Jerusalem – Society for the Protection of Nature in Israel
- Director water planning and development – Hagihon
- Director repair and maintenance of water infrastructure – Hagihon
- Director water meter reading and billing – Milgam
- Operation manager Har Homa wastewater treatment plant – Jerusalem Wastewater & Purification enterprise
- Community coordinator – Jerusalem Green Fund
- Community garden activist – Mizmor l'David community garden
- Community garden activist – Giant Sahbak community garden
- Community garden activist – Nature Museum garden
- Coordinator sustainability projects – Sur Baher community centre
- Municipal park volunteer – Gazelle Valley Park
- Community social worker – Multiple community gardens, e.g. Mevaseret Zion