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MS3: Analytical framework for governance regime assessment

Internal draft report outlining key elements of the review

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MS3: ANALYTICAL FRAMEWORK FOR GOVERNANCE REGIME ASSESSMENT

SUMMARY

This Milestone presents the DESSIN governance assessment framework, with specific suggestions on how to apply it. To this end, it briefly presents the DROP governance assessment tool, and then builds on a short review of the literature on innovation uptake in urban water management to develop potential questions for the analysis of innovation uptake in the mature sites based on the dimensions of the DROP assessment tool.

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List of Acronyms and Abbreviations

ESS	Ecosystem Service approach
WFD	Water Framework Directive

Executive summary

The DESSIN project aims to demonstrate and promote innovative solutions to water-related challenges with a focus on (i) water quality issues related to the implementation of the Water Framework Directive (WFD), and (ii) water scarcity. WP12 of DESSIN specifically aims at identifying innovative and innovation-friendly modes of governance, financing and payment.

The primary objective of MS3 is to provide a governance assessment framework or “guide”. The heart of the guide is a series of open questions to “guide” the exploration of (contextual) factors influencing the uptake of technologies in the water sector, focusing on particular sub-national and national circumstances, as well as considering the role of European and international factors. The guide will be applied to three case-studies in Task 12.2, and will inform the development of guidance in Task 12.4.

Rather than developing a new theoretical approach, the governance assessment framework in DESSIN primarily builds on the framework developed during the INTERREG DROP project (and previously the EU FP EUWARENESS project) and consists of three steps. The first step of the DESSIN governance assessment framework involves introducing the case-study, its broad characteristics, and the innovation(s) of interest. The second step involves answering the series of open questions regarding governance factors on innovation uptake. The third step consists in moving from the question-answer format into a coherent storyline of innovation uptake and governance regime influence.

This Milestone briefly presents the DROP governance assessment tool, and then builds on a short review of the literature on innovation uptake in urban water management to develop potential questions for the analysis of innovation uptake in the mature sites based on the dimensions of the DROP assessment tool. It finally presents the DESSIN governance assessment framework, with specific suggestions on how to apply it.

1. Introduction

1.1 What are DESSIN and WP12 objectives?

The DESSIN project aims to demonstrate and promote innovative solutions to water-related challenges with a focus on (i) water quality issues related to the implementation of the Water Framework Directive (WFD), and (ii) water scarcity. It also aims to demonstrate a methodology for the valuation of ecosystem services (ESS) as catalyser for innovation in water management. DESSIN takes into account the need to meet the requirements of “daughter directives” (e.g. drinking water, groundwater, urban wastewater, bathing water) as well as other European policy initiatives (e.g. EU Water Scarcity and Droughts; Blueprint for Water). In particular, DESSIN aims to promote more sustainable, adaptive, and cost-effective urban water management.

WP12 of DESSIN aims specifically to identify innovative and innovation-friendly modes of governance, financing and payment. It does so in four inter-related tasks:

- Development of an analytical framework for the assessment of governance regimes, with particular focus on conditions favourable to innovation.
- Identification of good practice aspects / hindering factors for uptake of innovative measures / technologies.
- Analysis of financial models / funding mechanisms encouraging uptake of innovative and sustainable measures, with consideration of ESS valuation uptake.
- Provide concrete guidance for practitioners linking good practice and lessons-learned in governance regimes and financing options, with the ESS framework.

This Milestone deals with the first bullet point, and presents an analytical framework for the assessment of governance regimes.

1.2 Innovations and governance in the context of DESSIN WP12

DESSIN starts from the basis that the water sector is a crucial part of modern economies, meeting basic human needs and adding value to society. At the same time it recognizes that the water sector faces many challenges, such as an aging infrastructure, inefficient forms of organization, and the need to increase environmental performance and respond to climate change. Innovations can help tackle these challenges, but they often face considerable barriers for their testing and uptake.

In DESSIN WP12, the main hypothesis is that governance variables can have a critical impact on the acceptability, affordability, and feasibility of innovations. The objective of WP12 is therefore to develop and apply a governance assessment framework to understand what can favour the uptake of innovations in the water sector.

DESSIN includes technological and process innovations in a number of areas: treatment of sewer overflow, restoration of hydro-morphology of river (Emscher), combined sewer overflows (Hoffselva), aquifer recharge recovery and desalinisation (Westland), sewer mining with ICT solutions (Athens), deep injection system in drinking water treatment plant (Llobregat), improved wastewater treatment through investment in capacity and real-time monitoring (Aarhus). Besides

these technological and process innovations also other dimensions of DESSIN could be considered as innovations, including concepts such as the ESS approach, or governance mechanisms such as increased collaboration between innovators, the water sector, etc.

Given the focus of DESSIN in aiming to foster technological uptake, innovation uptake in WP12 will primarily be **associated with the uptake of technologies that lead to what can be considered a significant change in urban water management locally**. In other words, the analytical focus is on the uptake of specific technologies. Other elements (concepts, administrative procedures, etc) will only be considered as contextual factors influencing technological uptake, even though they may be innovative themselves (Figure 1).

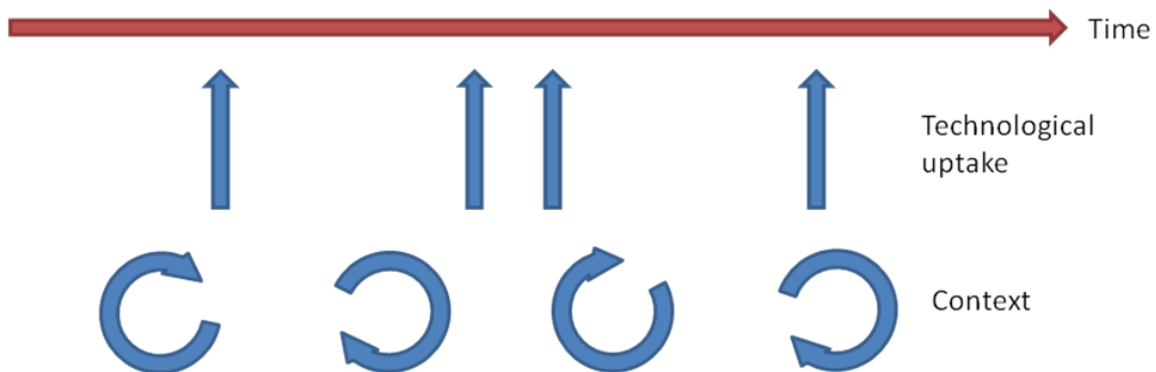


Figure 1. Schematic representation of innovation uptake in DESSIN

To define governance and to develop the assessment framework, DESSIN WP12 draws on the governance assessment tool developed within the INTERREG DROP project. Given that the DROP governance assessment tool was developed in the context of drought governance, for DESSIN WP12 purposes the tool had to be adapted to the context of urban water management and innovation uptake. Drawing on the DROP definition, governance in the context of DESSIN can be said to be the organisational, financial, political and legal aspects that guide and organise the interactions among, and collective actions taken by, public and private actors involved in the uptake of innovations in the water sector, or:

“Governance is the combination of the relevant multiplicity of scales, actor-networks, goals, strategies, responsibilities and resources that forms a context that, to some degree, restricts and, to some degree, enables actions and interactions in the uptake of innovations in urban water management.”

1.3 A governance assessment framework for DESSIN WP12

This Milestone and its DESSIN governance assessment framework (MS3 from Task 12.1) aims to contribute to the overall WP12 aim, to identify enabling factors, good practices and constraints to innovation uptake in urban water management – the end product being a manual for practitioners and policy-makers (D12.3 in Task 12.4).

MS3 will support data collection and analysis in Task 12.2, which is a comparative analysis of innovation uptake and governance factors across three mature case-studies (Aarhus, Ebro, Emscher). MS3 will produce a guide envisioned as being a series of open questions to explore the contextual factors influencing the uptake of water innovations in the water sector. Answering these

questions will provide the basis for developing “storylines” of innovation uptake and regime influence for each mature site as well as supporting a comparative analysis between the three mature sites. The analysis is to take a historical perspective on specific innovation uptake, trying to determine which factors influenced uptake. The guide will also include some questions that examine the economic dimensions of governance (e.g. distribution of resources, economic policy instruments), and will therefore support the work in Task 12.3.

Chapter 2 presents the DROP framework, and adapts it to the DESSIN context. A series of questions are thus developed using the theoretical foundations of the DROP tool and a review of the literature on the governance of urban water management. Chapter 3 is the guide itself, and presents a structured approach to developing storylines of innovation uptake. It provides guidance on how to select the cases of innovation uptake, how to answer the questions of the governance assessment tool, and how to develop the historical storylines.

2. Development of the governance assessment framework

Rather than developing a new theoretical approach, the governance assessment framework in DESSIN builds on the framework developed during the Interreg DROP project (and previously the EU FP EUWARENESS project). The main advantage of building on this framework is that it provides a coherent interdisciplinary (across the political and social sciences) theoretical basis to the analysis of governance in European environmental policy regimes. Another advantage is its high policy and practice relevance: the data generated should be easily applied and translated into best practices and policy recommendations.

The methodological approach to move from the DROP governance assessment tool to the DESSIN governance assessment framework was realised by 1) drawing on the DROP framework to cover relevant dimensions and criteria, and 2) using existing knowledge to make questions more specific to the context of innovation uptake in urban water management.

The first section of this chapter presents briefly the original DROP governance assessment tool. The second section uses a short review of the literature on innovation uptake in urban water management to develop potential questions for the analysis of innovation uptake in the mature sites based on the dimensions of the DROP assessment tool.

2.1 The DROP governance assessment tool (modified from Bressers et al., 2013)

The DROP governance assessment tool is grounded in Contextual Interaction Theory which starts with the assertion that multi-actor processes can be understood from the motivations, cognitions and resources of the stakeholders involved in the process. In turn these stakeholder characteristics are influenced by the specific case circumstances originating from previous decisions (themselves influenced and reflecting previous governance structures and qualities) and other case characteristics. The structural and general context can also exert direct influence on motivations, cognitions and resources of stakeholders, and thus on the process and its likelihood of success.

The starting point is the public and private policies (including any form of programmes and plans) taken by responsible public authorities as well as drinking and wastewater companies. Goals and means can be considered as structuring such policies. Goals arise from the perceptions of the problems at hand; particularly in a public sphere different goals are brought to the table by different people which represent the different dimensions of the problem at hand. Means are about the resources and organisation of implementation activities and the associated strategies and instruments. Governance in addition is not only multi-actor but it is also multi-scale. In the water sector, international, national and local factors are at play.

The DROP governance assessment tool includes five descriptive dimensions: levels and scales; actors and networks; perceptions of the problem and goal ambitions; strategies and instruments; resources and organisation (tasks and responsibilities) of implementation. Questions associated with each descriptive dimension are about governance as a context for action, not the action itself. It relates to the simple fact that a same or similar action/intervention can work out very differently in varying contexts depending on the wider (political) culture, or motivations and resources of powerful actors, etc. All dimensions include a question regarding the time dimension. They do not

aim to merely re-construct “history”, but aim to reveal important past or future developments relevant to on-going processes.

The DROP governance assessment tool adds four quality criteria:

- Extent: are all relevant aspects for the sector or project that is focused on taken into account?
- Coherence: are the elements of the dimensions of governance reinforcing rather than contradicting each other?
- Flexibility: are multiple roads to the goals, depending on opportunities and threats as they arise, permitted and/or supported?
- Intensity: how strongly do the regime elements urge changes in the status quo or in current developments?

These questions are applied to the above five dimensions. They move from a mere inventory of governance structures to assessing the degree of completeness and performance of governance structures. They necessarily call for subjective judgements. It may be necessary therefore to have more than one observer to ensure all important aspects or issues are considered, and make the observations less debatable.

The comparison of these elements across local/regional mature sites provides a framework for the discussion on the barriers to innovation uptake in the water sector, and will form the basis for the development of a tool that can guide such exploration in other contexts (Task 12.4).

2.2 Specification of the governance analysis framework for innovation uptake in urban water management

A short review of the literature on innovation uptake and transformation in urban water management was carried out to adapt the DROP assessment tool to the specific needs of DESSIN. This review is not centred on ESS related dimensions, but rather focuses on the broad literature on technological uptake in urban water management.

Two methods were used to collect existing knowledge on innovation uptake in urban water management. First, websites of past and on-going EU projects on urban water management were examined to collect project reports and deliverables examining governance and innovation uptake. Such projects included: FP6 SWIFT-WFD; FP7 PREPARED; FP7 SWITCH; FP7 TRUST. Second, two commonly used databases were searched (Google Scholar and Web of Science) using combinations of key words (e.g., urban, water sector, innovation, uptake, transition, transformation, barrier, change). Three main streams of research on change and transformation in urban water management were found: (1) policy and practitioner oriented papers, (2) more theoretical-oriented papers drawing on e.g. the Multi-Level Perspective (arising from science & technology studies) and (3) papers grounded in the complex system theory (arising from Social-Ecological Systems).

Overall the literature on urban water management observes that radical change in urban water management does not occur suddenly, but rather through some form of “system-hybridisation” where old and new technologies exist concurrently. Different phases have been identified, moving from unstructured and poorly organised systems to a gradual expansion of the use of water pipes, sewers, waste water treatment, and storm water infrastructure –usually as a response to public

health issues and environmental concerns. Lately, much debate is focused on how to improve the performance of the existing, mostly centralised approach, as well as complement or replace it with alternative or decentralised approaches (Hering et al., 2013; Marlow, 2013). Such approaches include a diverse range of technologies and practices, such as the “naturalisation” of waterways, disconnecting waterways from impervious surfaces (e.g. constructed wetlands), stormwater harvesting, water recycling, managed aquifer recharge, sewer mining, wastewater use (e.g. nutrient recovery), on-site wastewater treatment, and desalinisation. In addition, many “new” approaches are considered, which may not replace or complement old technologies but improve their performance (e.g. leak detection, real time monitoring).

A major barrier to system transformation commonly mentioned in the literature relates to the innovations themselves. First, major inertia in water infrastructure exists due to the durability of existing assets. Second, existing infrastructure is designed to be centralised and large-scale, and does not necessarily accommodate technologies that are decentralised and/or small-scale. Short investment cycles and institutional as well as technological 'lock-in' effects (Foxon et al., 2002) work against radical change and in favour of smaller innovations that support traditional systems and solutions. Third, the degree to which the technology has matured is a major factor influencing its uptake (Taverne, 2006). Technologies evolve through distinct phases, from being ideas into prototypes to marketable products, each step increasing its utility and usability for end-users.

While the above technology-related factors are important, the literature also points out governance factors, and emphasises that change in urban water management occurs through a co-evolutionary process between technological, social and ecological systems. The following five sub-sections map these factors against the dimensions of the DROP framework in order to identify key questions to be investigated in the mature site. In Chapter 3 a further detailed and applied description of the dimensions and related questions is provided.

2.2.1 Levels and scales

In the context of DESSIN, and drawing on the DROP framework, levels and scales are hydrological scales and administrative levels relevant to the uptake of innovations in urban water management.

What does the reviewed literature say about levels and scales?

The urban water cycle is constituted by water bodies (e.g. rivers, lakes, surface run-off and sub-surface flows), artificial structures (e.g. reservoirs, pipes, drains, tanks, gutters) and urban land (e.g. houses, pavements, gardens, parks). In addition, whole catchments and river basins, including upstream rural land, are increasingly taken into account for urban water planning (e.g. flood risk management, water quality improvements). Given the multiplicity of elements in the urban water cycle, multiple “social” levels are in play. The lowest level is mostly characterised by policies and activities of water companies and local authorities, acting on household and business level. Regional and state/federal levels are dominated by the regulative activities of governments on water companies and local authorities; while the international level, in Europe, mostly relate to the regulative activities of the European institution and the influence of international markets.

The reviewed literature sees these multiple levels as a complex, nested system of rules which often works for the status-quo (Marlow et al., 2013; Markard, 2011; Taverne, 2006). In Australia for example, a major barrier to the establishment of Water Sensitive Cities is the lack of understanding of the urban water cycle and the potentially far-reaching impacts associated with the introduction of new technologies (Ryke et al., 2013). Managers of urban water systems must meet strict user

demand and needs, and comply with regulatory standards. They may be unwilling to take risks by introducing an innovation in a system where it is difficult to predict impacts and understand trade-offs. Two strategies are highlighted in the literature that may help deal with this complexity and encourage innovation uptake: (1) decentralisation (e.g. devolution of power) –because smaller systems can be more readily understood- (Smits et al., 2008), and (2) the use of experimentation and pilot studies (Marlow et al., 2013).

Specifying the DROP framework for levels and scales for DESSIN

The first step (as suggested in the DROP framework) is to describe which scales (e.g. catchments, water bodies, rivers, lakes, surface run-off, sub-surface flows, reservoirs, pipes, drains, tanks, gutters, houses, pavements, gardens, parks) and levels (i.e. public authorities at municipal, regional, national, European) are associated with the innovation. Potential questions may include:

Criteria	Question
Descriptive	<ul style="list-style-type: none"> • What administrative levels (i.e. public authorities at municipal, regional, national, European) are relevant for innovation uptake? How (e.g. general responsibility in innovation uptake and implementation)? • Which hydrological scales do they relate to?
Extent	<ul style="list-style-type: none"> • Are important administrative levels missing? With which effect?
Coherence	<ul style="list-style-type: none"> • Are there conflicts or synergies between administrative levels?
Flexibility	<ul style="list-style-type: none"> • Is it possible for one administrative level to take leadership for innovation uptake?
Intensity	<ul style="list-style-type: none"> • Is there a strong impact from a certain administrative level?

2.2.2 Actors and networks

Drawing on the DROP framework, actors and networks are, in the context of DESSIN, the range of public authorities, private companies and other stakeholders, and the inter-organisational structures (e.g. fora), involved in, benefiting from or impacted by innovation uptake in urban water management.

What does the reviewed literature say about actors and networks?

A large range of actors potentially influence innovation uptake. Butterworth & Morris (2007) identified: those taking and effecting decisions (policy-makers, service providers, national regulatory agencies, local government planners), those closely influencing decision-making (e.g. civil society, individuals, water users, professional associations, unions), those supporting research and advisory activities (e.g. academia, consulting, training), local champions working to address cross-cutting issues, the media and financial institutions (e.g. banks, investment agencies). Other actors may include technology-related actors such as laboratories, manufacturers, and distributors (Rouillard et al., 2006). Recent studies (Huitema and Meijerink 2009; Brouwer, 2013) suggest that by effectively placing emphasis on particular strategies, individual change agents or so-called policy entrepreneurs in particular are well capable of affecting policy change and may therefore play an important role in the uptake of innovations.

The literature commonly identifies fragmentation as a major barrier to innovation diffusion. Fragmentation is not only expressed in the number of actors, but also in the range of relevant

sectors (e.g. water supply, wastewater and stormwater, waste, agriculture, and energy), associated networks, policies, regulations, etc. The EIP (2014) states that a lack of strategic and planning capabilities within and across organisations hinders innovation uptake in the water sector, in particular due to actors being small and largely independent of each other while having very different interests. Limited exchange between innovators, manufacturers and distributors, and end-users has been found to reduce the usability of innovations and act as a major impediment to their uptake (Rouillard et al., 2006).

As highlighted in the Innovation System Frame (OECD, 2005), a proportion of scientific and technological knowledge is unwritten, and alongside framework conditions human, social and cultural transfer factors, including mobility and international links, must be given due consideration. Much of the reviewed literature highlights that innovation uptake could benefit from greater exchange and collaboration between actors. Projects in Europe and Australia have explored the role of participatory mechanisms as an avenue for innovation uptake. “Learning Alliances” or “shadow networks” for example are platforms that aim to foster informal debates of problems and potential solutions, so that strategies will be generated for addressing institutional constraints and enhancing institutional learning (Verhagen et al., 2008). However, while some studies suggest that increased participation and the set up of consultative networks has led to system transformation and innovation uptake (e.g. Makropoulos et al., 2012; Smits et al., 2008), other studies remain more critical (e.g. Hering et al., 2013).

Specifying the DROP framework for actors and networks for DESSIN

The first step (as suggested in the DROP framework) is to describe the characteristics of actors and networks. Potential questions may include:

Criteria	Question
Descriptive	<ul style="list-style-type: none"> Which actors are involved in the uptake of the innovation? Why? Which actors are only involved as affected by or beneficiaries of the innovation? What forms of dialogue (e.g. public participation, expert fora, etc) exist between actors? Are they informal or institutionalised?
Extent	<ul style="list-style-type: none"> Are all relevant actors involved in the relevant fora for innovation uptake? Are any actors excluded?
Coherence	<ul style="list-style-type: none"> How would you describe the interactions (e.g. history of working together) and opposition between actors? Are there actors with a mediating role?
Flexibility	<ul style="list-style-type: none"> Is it possible for new actors to be included in relevant fora?
Intensity	<ul style="list-style-type: none"> Is there a strong influence or pressure from one or more specific individual actors (“policy entrepreneurs”) and/or coalitions of actors towards supporting/preventing innovation uptake?

2.2.3 Problem perceptions and goals ambitions

Drawing on the DROP framework, problem perception and goals ambition are, in the context of DESSIN, the various angles that debate took towards the innovation and its uptake in urban water management.

What does the reviewed literature say about problem perceptions and goals ambitions?

The reviewed literature strongly supports the view that problem perception and personal interests (or goals) of involved actors are major factors influencing innovation uptake. Potential users of innovations do not necessarily use the best solution, but the satisfactory one, influenced by such variables as loyalty, habits and cost of change (Marlow et al., 2013; Taverne, 2006). The water sector is generally considered risk-adverse because of the financial risks involved in changing a sector characterised by large capital investments.

At a more specific level, innovations may require different expertise and capabilities within an organisation, and may thus be actively opposed by those negatively impacted by the associated changes in competencies (Taverne, 2006). More broadly, innovations related to water production and distribution (e.g. water re-use and recycling) often face low acceptance by policy makers and the general public (EIP, 2014; Marlow et al., 2013). In these circumstances, innovation uptake often occurs through a wait-and-see where diffusion is fostered mostly through imitation from first “uptake champions” (Ryke et al., 2013; Butterworth and Morris, 2007; Taverne, 2006).

Some researchers argue that change usually occurs through crisis, e.g. perception of high environmental impacts of certain practices or the impossibility to ignore shortcomings of the existing system through an exceptional weather event or financial strain. Some authors believe more generally that a cultural change in practitioners' behaviour is necessary, towards more openness for emerging and multi-disciplinary approaches (Hering et al., 2013; Marlow et al., 2013). The uptake of innovation can be encouraged by continuously improving the understanding of the system being managed on the basis that knowledge gathering is a major step in influencing perceptions and attitudes to uncertainties and risks (Makropoulos et al., 2012).

Specifying the DROP framework for problem perceptions and goals ambitions for DESSIN

The first step (as suggested in the DROP framework) is to describe what positions are held by different actors and what is stipulated in the relevant policies. Drawing on these ideas, potential questions may include:

Criteria	Question
Descriptive	<ul style="list-style-type: none"> Which various angles does the debate on the uptake of the innovation take?
Extent	<ul style="list-style-type: none"> How similar/different is the goal associated with the uptake of innovation from the status quo?
Coherence	<ul style="list-style-type: none"> To what extent do views/arguments/positions support each other, and to what extent are they in competition?
Flexibility	<ul style="list-style-type: none"> Are actors encouraged to re-assess their own perspectives? Are compromises made in the process of innovation uptake? Does new knowledge of the system (e.g. ecological, social, economic) play a role in making the case for innovation uptake? What types of evaluations are done (e.g. stakeholder analysis, cost-benefit, non-monetary evaluations)? Are pilot studies conducted at a smaller scale before full-blown implementation? How do evaluations and/or pilot studies influence uptake?
Intensity	<ul style="list-style-type: none"> To what extent does one/several perspective(s) dominate the process of innovation uptake?

2.2.4 Strategies and instruments

Drawing on the DROP framework, strategies and instruments are, in the context of DESSIN, the particular approaches and the regulatory, economic and voluntary forms of policy action influencing innovation uptake in the water sector.

What does the reviewed literature say about strategies and instruments?

It is commonly accepted that policy instruments on urban water management can create barriers to innovation uptake (e.g. when they forbid specific activities or by-products) (Ryke et al., 2013), but can also drive innovation adoption (e.g. by requiring new standards or practices) (Rouillard et al., 2006). For example, the current standard of public procurements is believed to constrain innovation uptake by giving preference to low(est) cost offers and proven technologies (EIP, 2014).

The reviewed literature agrees that the water sector is embedded in an intricate regulatory environment with requirements at EU and national levels, resulting in, for the EIP (2014), increase of the overall cost of certifying innovations (across the EU) and favouring of sub-optimal innovations for which the cost of getting approval across national contexts can be justified. For the EIP (2014), homogenising requirements across the EU has the potential to stimulate innovations and their diffusion at lower costs.

The reviewed literature puts great emphasis on the role of policy for increasing innovation uptake in practice (Butterworth and Morris, 2007). Innovations are supported by strategies that are long-term and provide investment security to innovators (Makropoulos et al., 2012; Rouillard et al., 2006). Strategies to develop human and social capital for innovation uptake are also important. Ryke et al. (2013) argue for a mix of informal communicative networks to exploit tacit knowledge and decentralised implementation to build local capacities. In addition they argue for regulative/legislative approach to catalyse innovation uptake and build economies of scale once networks for experimenting and learning have enabled the exploration of the potential for innovations, and market-based (see next sub-section) approaches to further mainstream and sustain innovation uptake.

Innovation uptake may be limited by the type of financial model used. For example pricing policies based on high standing charges (as mostly done currently) do not give incentives to reduce consumption (and adopt water efficient technologies) (Marlow et al., 2013). Innovation uptake can also be limited because innovations may challenge dominating financial models. For example, strategies based on decentralisation and/or diversification could impair economies of scale achieved through large scale centralised infrastructure, as well as reduced their revenues (e.g. in the case of increased consumption of reused water leading to reduced consumption of drinking water) (Marlow et al., 2013).

Many researchers acknowledge the existence of market failure in the water sector whereby financial incentives for investing are low due to the high capital cost of urban water infrastructures. Typically, government funds are used to support investment in the water sector. In addition, the market would typically discount non-economic benefits, and it is thought that innovation uptake can benefit from alternative public and private financial models, based on the valuation of multiple benefits, and non-monetary factors/externalities, or on appropriate tariffs and investment cycles (Marlow et al., 2013; Hering, 2013).

Specifying the DROP framework for strategies and instruments for DESSIN

The first step (as suggested in the DROP framework) is to describe these policy instruments. Potential questions may include:

Criteria	Question
Descriptive	<ul style="list-style-type: none"> Which strategies and policy instruments are relevant for the innovation? Do they reflect a regulative, incentive, communicative, or technical approach? In particular, what pricing policy and financial cycle arrangements exist? What costs do they include (e.g. capital, maintenance, resource, environmental)?
Extent	<ul style="list-style-type: none"> How (specific rules, mechanisms) do the different strategies and policy instruments (intentionally or unintentionally) facilitate innovation uptake? In particular, how do pricing policies and financial cycles facilitate innovation uptake?
Coherence	<ul style="list-style-type: none"> Are there any (intended or unintended) synergies and/or conflicts between strategies and instruments?
Flexibility	<ul style="list-style-type: none"> Can policies and instruments be adjusted to support innovation uptake? In particular, can pricing policies and/or timing of expenditure be adjusted as a way of facilitating innovation uptake?
Intensity	<ul style="list-style-type: none"> Are strategies and policy instruments effective in encouraging innovation uptake? In particular, are pricing policies and/or timing of expenditure adequate to raise/support resources for innovation uptake?

2.2.5 Responsibilities and resources

Drawing on the DROP framework, responsibilities and resources are, in the context of DESSIN, the allocation of tasks, powers and capacities influencing innovation uptake in urban water management.

What does the reviewed literature say about responsibilities and resources?

As discussed above, fragmentation of tasks and powers across multiple organisations is commonly seen as potentially creating barriers to innovation uptake, as well the way that tasks are crafted (e.g. regulatory requirements applied onto specific authorities). For example, water quality monitoring agencies may focus on measuring chemicals that are part of their statutory duties, rather than attempt to measure emerging pollutants (and adopt relevant innovations for measuring those) (Rouillard et al., 2006).

The reviewed literature discusses in length the role of resources, in particular financial ones, in modulating innovation uptake. Many studies highlight that uptake is highly dependent on investment cycles which, in the water sector, is skewed by typical large-scale, long-term investments: transformation therefore usually occurs in times of massive needs of re-investment (Markard, 2011). The EIP (2014) observes that water companies must face, in some circumstances, a low pay-back on investments and weak profitability, which can limit interest in risky initiatives such as innovation uptake. In parallel, SMEs innovating in the water sectors still face a lack of financial resources (both in total funding and continuity) for further development, customization, demonstration and commercialization (EIP, 2014; Rouillard et al., 2006).

Specifying the DROP framework for responsibilities and resources for DESSIN

The first step (as suggested in the DROP framework) is to describe the allocation of tasks and the resources available to effectuate those tasks. Potential questions may include:

Criteria	Question
Descriptive	<ul style="list-style-type: none"> • What are the mandates (as set by statutes and regulations) of the different actors that are of relevance for the innovation uptake? • What technical, financial, knowledge, social, cultural (e.g. norms, values, symbols, artifacts) resources are available/used to encourage innovation uptake?
Extent	<ul style="list-style-type: none"> • Are there any “missing” types of mandates and resources for enabling innovation uptake?
Coherence	<ul style="list-style-type: none"> • Does the allocation of responsibilities and mandates create cooperation or struggles on innovation uptake?
Flexibility	<ul style="list-style-type: none"> • Can roles, responsibilities and resources be adjusted to support innovation uptake? In particular, does capacity-building play role in innovation uptake?
Intensity	<ul style="list-style-type: none"> • Are responsibilities and statutory powers (i.e. specific legal authority granted to enforce/enable mandates) strong enough to enable innovation uptake? • Are enough resources allocated to enable innovation uptake?

3. The DESSIN governance assessment framework

The DESSIN governance assessment framework consists of three steps. The first step involves introducing the case-study, its broad characteristics, and the innovation(s) of interest. The second step involves answering a series of open questions regarding governance factors on innovation uptake. The third step consists in moving from the question-answer format into a coherent storyline of innovation uptake and governance regime influence.

As defined in Chapter 1, innovations in DESSIN WP12 are associated with technologies, understood as concrete measures, products or tools, that have led or are leading to what can be considered a significant change in urban water management locally.

The analytical focus is on the uptake of specific technologies. Other elements (concepts, administrative procedures, etc) will only be considered as contextual factors influencing technological uptake, even though such contextual factors may be innovative themselves. Nevertheless, it is possible, and recommended, to select cases where not only the technology was innovative but also the governance factors were (e.g. use of new form of partnership or administrative procedure), in order to learn from new experiences in fostering technological uptake.

WP12 aims to examine successful cases of technological uptake in urban water management, independent from the question *whether the ESS approach was used or not*. If the ESS approach has been explicitly used in the case-study, particular attention can be given to the ways in which the concept has raised awareness, formed argument, or structured the innovation process.

It is possible and recommended to include counter examples when answering questions (and hence ask for them in the interviews), in particular where it is useful to contrast why a particular factor was critical or not in the case examined as opposed to other similar cases. If during the interview no contrasting examples are used naturally by interviewees, the interviewer can specifically ask for such contrasting examples.

The questions of the governance assessment framework are not designed to be interview questions, although this does not prevent their use in interviews. They mainly serve to diagnose the innovation uptake, guide the analysis in a comprehensive manner, ensure consistency and comparable results, and support the development of storylines (section 2.3). The questions suggested are “model questions” that can be used as drafted, or adapted to the particular context/information gaps.

A step-wise approach is recommended:

- Based on personal knowledge, documentary evidence and close contacts, to try and answer as many questions as possible, and single out important ones
- Identify key knowledge gaps, and carry out a small number of interviews (e.g. 4-5) with relevant knowledge holders
- Expand as necessary

Ecologic Institute, KWR and SINTEF will assist in the process of developing interview questions, review the outcome of data analysis following each of these steps, identify key knowledge gaps and

guide the next data collection step. However, the primary responsibility for case-study selection, data collection and data analysis remain with the mature site leaders (CETaqua, DHI, EG).

On carrying out interviews...

Interviews will most likely be needed to answer the questions below, and retrace the historical development of innovation uptake. Target interviewees might be: operators of urban water services; river basin/water authorities; local council planners; regulatory agencies; R&D organisations; manufacturers/distributors; civil society representatives (e.g. environmental NGOs, consumer groups); coordinators of the innovative project, etc.

The interview questions should encourage the interviewee to describe and explain the innovation uptake in a historical perspective. While some of the questions below could be used during interviews, it is highly recommended to follow a more gradual approach and standards of good practice in carrying out interviews. This means starting with open questions before asking more specific and targeted ones in order to ensure that the interview is not biased towards particular factors or dimensions.

Potential topics the start the interview may be:

- Asking to describe their past involvement with urban water management at the time of innovation uptake
- Asking why a change in urban water management was needed
- Asking why that particular innovation was selected

The next pages present the governance assessment framework.

3.1 Step 1: General introduction to the case-study

- Briefly present key environmental, social and economic characteristics of the case-study (e.g. size, population, etc) and its main challenges (e.g. water issues, in particular those related to innovation uptake)
- To briefly describe the technological uptake or the series of related technological uptakes of interest: key characteristics and purposes (e.g. water quality improvement, water scarcity, flood risk reduction); technical barrier to its uptake (e.g. mismatch with dominant infrastructure, complexity of technology)

3.2 Step 2: Assessing governance factors

The next step involves answering a series of open questions (developed in Chapter 2) based on documentary and interview evidence.

3.2.1 Levels and scales

What administrative levels (i.e. public authorities at municipal, regional, national, European) were relevant for innovation uptake? How (e.g. general responsibility in innovation uptake and implementation)? Which hydrological scales did they relate to?

Please explain

Were important administrative levels missing? To what effect?

Please explain

Were there conflicts or synergies between administrative levels?

Please explain

Was it possible for one administrative level to take leadership for innovation uptake?

Please explain

Was there a strong impact from a certain administrative level?

Please explain

3.2.2 Actors and networks

Which actors were involved in the uptake of the innovation? Why? Which actors were only involved as affected by, or beneficiaries of, the innovation?

Please explain

What forms of dialogue (e.g. public participation, expert fora, etc) existed between actors? Were they informal or institutionalised?

Please explain

Were all relevant actors involved in the relevant fora for innovation uptake? Were any actors excluded?

Please explain

Was it possible for new actors to be included in the relevant fora?

Please explain

How would you describe the strength of interactions (e.g. history of working together) or opposition between actors?

Please explain

Were there actors with a mediating role?

Please explain

Was there a strong influence or pressure from one or more specific individual actors ("policy entrepreneurs") and/or coalition of actor) towards supporting/preventing innovation uptake?

Please explain

3.2.3 Goals and ambitions

Which various angles did the debate on the uptake of the innovation take? How similar/different was the goal associated with the uptake of innovation from the status quo?

Please explain

To what extent did views/arguments/positions support each other, and to what extent were they in competition?

Please explain

How, if at all, were actors encouraged to re-assess their own perspectives? Were compromises made in the process of innovation uptake? To what extent did one/several perspective(s) dominate the process of innovation uptake?

Please explain

Did new knowledge of the system (e.g. ecological, social, economic) play a role in making the case for innovation uptake?

Please explain

What types of evaluations were done (e.g. stakeholder analysis, cost-benefit, non-monetary evaluations)? Were pilot studies conducted at a smaller scale before full-blown implementation? How did the evaluations and/or pilot studies influence uptake?

Please explain

3.2.4 Strategies and instruments

Which strategies and policy instruments were relevant for the innovation uptake? Did they reflect a regulative, incentive, communicative, or technical approach?

Please explain

In particular, what pricing policy and financial cycle arrangements existed? What costs did they include (e.g. capital, maintenance, resource, environmental)?

Please explain

How (specific rules, mechanisms) did the different strategies and policy instruments (intentionally or unintentionally) facilitate innovation uptake or work against it? How effective were they in encouraging innovation uptake?

Please explain

How did pricing policies and financial cycles facilitate innovation uptake? To what extent were they effective in supporting and/or raising resources for innovation uptake?

Please explain

To what extent did strategies and instruments support each other, or were in competition? Were there any (intended or unintended) synergies and/or conflicts between strategies and instruments?

Please explain

Could policies and instruments be adjusted to support innovation uptake? In particular, could pricing policies and/or timing of expenditure be adjusted as a way of facilitating innovation uptake?

Please explain

3.2.5 Responsibilities and resources

What were the mandates (i.e. responsibilities as set by statutes and regulations) of the different actors that are of relevance for the innovation uptake?

Please explain

What technical, financial, knowledge, social, cultural (e.g. norms, values, symbols, artifacts) resources were available/used to encourage innovation uptake?

Please explain

Were there any “missing” types of mandates or types of resources for enabling innovation uptake?

Please explain

Did the allocation of roles and resources create cooperation or struggles on innovation uptake?

Please explain

Could roles, responsibilities and resources be adjusted to support innovation uptake? In particular, did capacity-building play role in innovation uptake?

Please explain

Were mandates and statutory powers (e.g. specific legal authority granted to enforce/enable mandates) strong enough to enable innovation uptake? Were enough resources allocated to enable innovation uptake?

Please explain

3.3 Step 3: Storylines of technological uptake

Building the storyline is the last step of analysis, and is meant to be a chronological synthesis of innovation uptake at the mature site highlighting the key processes and factors influencing innovation uptake. Either approach may be used, depending on local interest and capacities.

The first approach may be a simple formulation of the chronological synthesis based on the answers to the guide's questions and written by the mature site leader (with iterative review by other researchers and potentially interviewees). The objective for those developing storylines would be to maximize neutrality and objectivity and placing emphasis on facts and general principles.

The second approach is presenting the storylines in the form of learning histories (Kleiner and Roth, 1997). A learning history is a more dialogical assessment document, with a distinct, two-column layout. The right column presents the storyline as narrated by those interviewed, and their experiences of the chronology are presented through citations. In this way, those who participated in the uptake communicate more directly to the reader. The variety of views and reactions brings out nuances and adds transparency to the assessment. The left column consists of comments, questions, interpretations and conclusions by the analysts who produce the document. With this format the subjective dimension is made explicit and the complex motivations and forces influencing the technological uptake are acknowledged. A learning history must be validated and revised together with those interviewed before it is distributed and used. The underlying perspective resonates well with the DROP definition of governance, and the format is tailored for organizational and inter-organizational learning as well as assessment. Thus, it may generate more knowledge about technological uptake and be of wider use to the involved actors than a conventional storyline.

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