Framework for Sustainability Assessment of UWCS and development of a self-assessment tool

HELENA ALEGRE
ENRIQUE CABRERA JR
ANDREAS HEIN
HELGE BRATTEBØ

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TRANSITIONS TO THE URBAN WATER SERVICES OF TOMORROW

Framework for Sustainability Assessment of UWCS and development of a self-assessment tool

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Authors

Helena Alegre, LNEC

Helge Brattebø, NTNU

Enrique Cabrera Jr, ITA

Andreas Hein, IWW

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1. INTRODUCTION

The main objective of the TRUST project (Transitions to the Urban Water Services of Tomorrow) is to support water authorities and utilities in Europe in formulating and implementing appropriate urban water policies in order to enhance urban water cycle services. TRUST's aim is to deliver knowledge to support urban water cycle services (UWCS) towards a sustainable and low-carbon water future without jeopardizing service quality. It will achieve this through research-driven innovations in governance, modeling concepts, technologies, decision support tools, and novel approaches to integrated water, energy, and infrastructure asset management. There is no single or clear pathway for the adoption of sustainable practices for water utilities, cities, or any other organization involved in UWCS. Equally, there is currently no consensus on how to assess the sustainability of UWCS.

This document represents the main written output of Work Package 31 within TRUST. Together with the self-assessment tool published online (http://self-assessment.trust-i.net) it completes the set of deliverables that were outlined in the project proposal.

The aim of WP 31 was to define and develop a UWCS performance assessment framework taking into account not only the system variables, such as energy, cost, chemicals and materials, but also reflecting the local context in terms of economic, social and environmental conditions and allows for benchmarking the sustainability of the UWCS.

The specific objectives of the WP were described as follows:

• Define and develop generic performance criteria that UWCS systems could be evaluated against, under given socio-economic conditions.

• Develop a set of corresponding performance indicators.

• Develop a web-based self-assessment tool for UWCS systems.

These objectives have been attained in several stages and the intermediate findings that were reflected in several of the project's internal documents are included in this deliverable.

As a first step towards the final goal of a self-assessment tool, a general assessment framework was designed including generic UWCS dimensions and performance criteria that would serve as a starting point for any performance and sustainability assessment systems to be developed within TRUST and even elsewhere.

Underlying assumptions for the development of this framework were:

- Need to have a flexible approach within TRUST that allows to tailor the assessment metrics to the specific needs of each WA, WP or task

- Need of consistency and harmonization between the performance assessment tools used in the scope of TRUST to compare alternative transition pathways, to compare

technologies, or to assess the sustainability of the UWCS, while avoiding dispersion and adoption of an excessive number of metrics.

- Need to take advantage of the existing, mature and internationally recognised performance assessment systems for urban water services, with particular attention to the IWA performance indicators systems (Alegre et al., 2006 and Matos et al., 2003).

- Need to incorporate the guidelines established in the ISO standards on the assessment and improvement of the drinking water and wastewater services (ISO 24510: 2007, ISO 24511: 2007; ISO 24512: 2007).

- Need to open up the assessment system to metrics that include not only performance indicators, as the IWA PI systems do, but also other performance assessment metrics (PAMs) more adequate to compare alternatives and scenarios, or to consider aspects that, by nature, are more subjective or qualitative.

In addition to the establishment of a generic framework, WP31 also focused on the development of a specific self-assessment tool, which presented some clear boundary conditions for its development:

- Easy-to-use assessment tool that would provide utilities with a first glimpse of readiness towards the 2040 target.
- Avoid data-hungry indicators that would require substantial efforts from those using the tool. Data requested by the tool should be readily available in an average European utility.
- Self-assessment target should be around 3 hours for a regular utility with some sort of information management procedures.
- The main aim of the tool is NOT to provide a thorough or final assessment of the readiness of the utility towards the 2040 sustainability target, but create an initial interest on the matter by means of a rough estimation of the areas in need of further attention.
- Additionally, the tool should direct the users to the appropriate TRUST tools to improve and reach the 2040 target.

It was however soon clear that in order to develop an assessment of the readiness of a city for the 2040 challenge, it was important to define sustainability from the TRUST perspective. It should be stressed that this should not be viewed as an attempt to redefine the concept of sustainability, but rather the answer to the need of having a project-wide definition of sustainability that could be used for assessment purposes in any of the project's tools and deliverables.

Therefore, the TRUST framework for Urban Water Cycle Sytems (UWCS) sustainability was not only to provide a definition of sustainability, but also the criteria that would be adequate

for an assessment of such concept. These definition and criteria are the components of the TRUST proposition on sustainability.

2. TRUST PROPOSITION ON SUSTAINABILITY

Sustainability is commonly perceived as the social, environmental and economic qualities of a given system under study, in a holistic and long-term perspective. This represents the so-called triple bottom line (TBL) dimensions of sustainability (Elkington, 1997).

In order to comply with the general internationally well-recognized TBL definition, we believe that social, environmental and economic sustainability should be the main dimensions of a UWCS sustainability definition for TRUST, with a further two dimensions (assets and governance) as required supporting dimensions. The sustainability of urban water services is mutually dependent on other urban subsystems such as energy, solid waste management and transportation. A long-term oriented UWCS sustainability definition would benefit from addressing possible contributions to the overall urban sustainability.

This leads to the following proposed UWCS sustainability definition for use within the TRUST project:

> Sustainability in urban water cycle services (UWCS) is met when the quality of assets and governance of the services is sufficient to actively secure the water sector's needed contributions to urban social, environmental and economic development in a way that meets the needs of the present without compromising the ability of future generations to meet their own needs..

3. TRUST PROPOSITION ON SUSTAINABILITY ASSESSMENT

On the basis of what is presented above, we propose the following definition of what is expected of a UWCS sustainability assessment in TRUST:

Sustainability assessment of urban water cycle services in TRUST includes the main dimensions of social, environmental, economic and the supporting dimensions of assets and governance sustainability.

The assessment should in particular provide insights in how to improve the management and development of UWCS assets and governance, as part of a strategic transition process towards 2040, in order to positively influence the end dimensions of social, environmental and economic sustainability.

The assessment is made operational by critically and carefully examining a chosen set of performance metrics/indicators and how they comply with a predefined set of sustainability objectives and criteria. The performance metrics/indicators may be quantitative and/or qualitative, and are specifically chosen in order to take account of the particular context and challenges of a given urban water cycle system, in a medium- and long-term transition context.

The UWCS sustainability assessment method must be transparent, valid and holistic, and should make use of a metabolism and life-cycle assessment perspective when this is needed. The assessment method should be inclusive and flexible with respect to stakeholder involvement and decisions regarding target setting and trade-off as part of a multi-criteria decision analysis process.

The rationale for considering the supporting dimensions of assets and governance is to make explicit two important dimensions for complex infrastructure-based systems like UWCS. Assets are associated with the system of physical infrastructure, namely their durability, reliability, flexibility and adaptability, but also soft infrastructure, meaning human capital as well as information and knowledge management. Governance relates to the political, social, economic and administrative processes which affect the development, delivery or management of water resources and services. Key governance considerations are transparency, broad participation in decision making, the effectiveness and efficiency of measures taken, the quality of the accountability and adjustment mechanisms, and also the existence and alignment of city planning with UWCS.

Figure 1 presents the TRUST approach to sustainability assessment and Table 1 contains the dimension, objectives and criteria of UWCS sustainability.
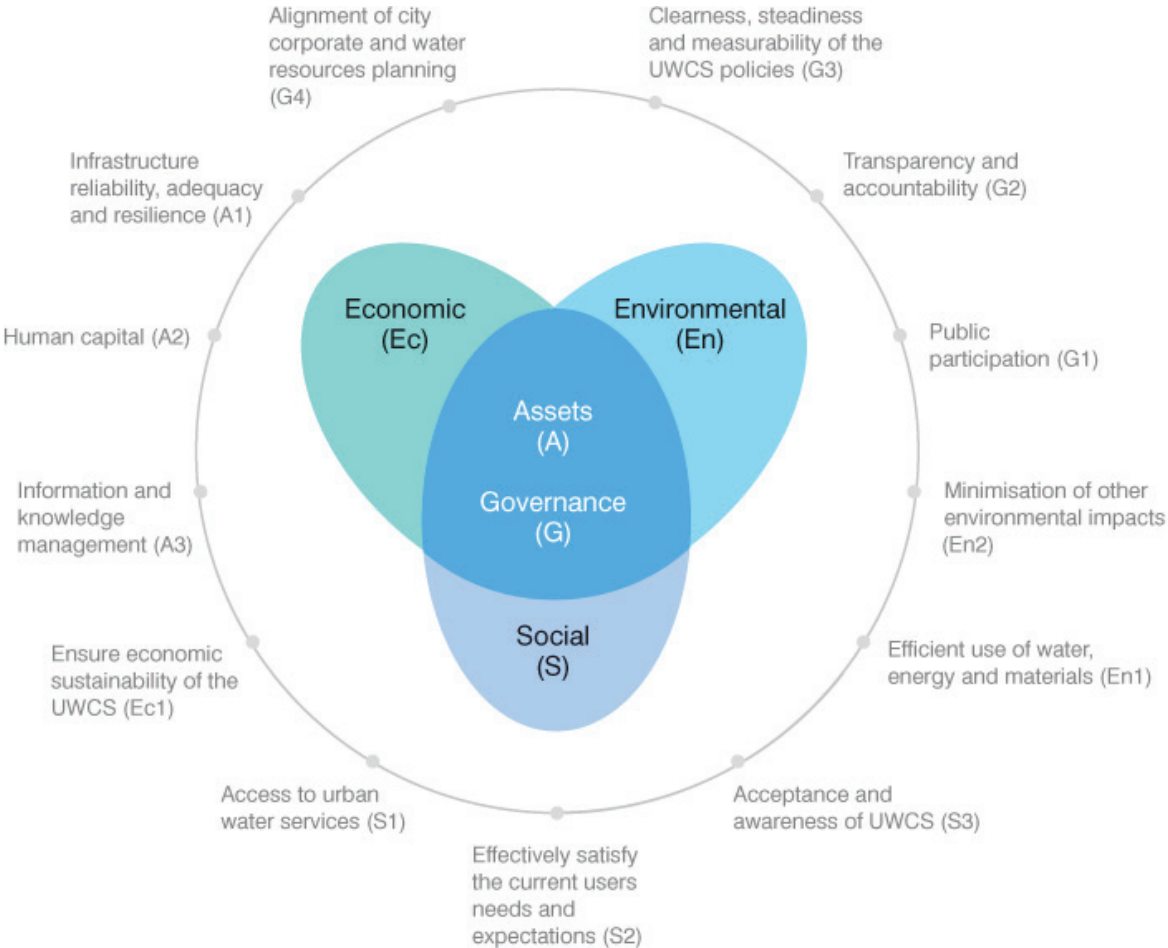

Figure 1: TRUST approach to sustainability assessment

DIMENSION	OBJECTIVES	ASSESSMENT CRITERIA
Social	S1) Access to urban water services S2) Effectively satisfy the current users' needs and expectations S3) Acceptance and awareness of UWCS	S11) Service coverage S21) Quality of service S22) Safety and health S31) Affordability
Environment	En1) Efficient use of water, energy and materials En2) Minimisation of other environmental impacts	En11) Efficiency in the use of water (including final uses) En12) Efficiency in the use of energy En13) Efficiency in the use of materials En21) Environmental efficiency (resource exploitation and life cycle emissions to water, air and soil)
Economic	Ec1) Ensure economic sustainability of the UWCS	Ec11) Cost recovery and reinvestment in UWCS (incl. cost financing) Ec12) Economic efficiency Ec13) Leverage (degree of indebtedness) Ec14) Willingness to pay
Governance	G1) Public participation G2) Transparency and accountability G3) Clearness, steadiness and measurability of the UWCS policies G4) Alignment of city, corporate and water resources planning	G11) Participation initiatives G21) Availability of information and public disclosure G22) Availability of mechanisms of accountability G31) Clearness, steadiness, ambitiousness and measurability of policies G41) Degree of alignment of city, corporate and water resources planning
Assets	A1) Infrastructure reliability, adequacy and resilience A2) Human capital A3) Information and knowledge management	A11) Adequacy of the rehabilitation rate A12) Reliability and failures A13) Adequate infrastructural capacity A14) Adaptability to changes (e.g. climate change Adaptation) A21) Adequacy of training, capacity building and knowledge transfer A31) Quality of the information and of the knowledge management system

This framework establishes the basic rules to facilitate the development of the individual assessment metrics that other working packages outside WP31 may need. Although the objectives and criteria aim at being of general use within TRUST, the performance metrics presented later are not intended to cover all the needs of the project, and other assessment systems will be developed as needed for other project deliverables.

These are guidelines to use within TRUST to assure that all assessment systems in the project are well grounded and fully consistent with each other, and to avoid duplication.

4. UWCS PERFORMANCE ASSESSMENT SYSTEM

The final goal of any performance assessment system is to provide information. It is important to make the distinction between information and data. A correct definition for information would be "data that can be used for the purpose of making decisions". Consequently, a system of performance indicators is not only aimed at providing the value of a few ratios, but also all the complementary elements (quality of the data, explanatory factors, context) that are needed in order to make appropriate decisions.

The performance assessment system is consequently the result of considering all areas of interest, stakeholders and influencing factors in a certain environment. In the case of water undertakings, the considered system would comprise the whole company, the stakeholders, the users, the environment, and all related areas that may be worth monitoring for management purposes.

Setting up objectives, assessment criteria, metrics and targets is a crucial stage in order to set up clear directions of action, as well as accountability of results through timely review. This sequence shall be followed to establish TRUST PAS. Clarifying the four distinct but sequential concepts:

- **Objectives** are the goals that the organization aims to achieve. According with the ISO 24510:2007, 24511:2007, 24512:2007 standards, TRUST performance assessment should always be linked to objectives that are clear and concise, as well as ambitious, feasible and compatible, and take into account the ultimate goal for the utility of providing a sustainable service to society. For each objective, it is recommended that key assessment criteria be specified.

- **Assessment criteria** are points of view that allow for the assessment of the objectives. For each criterion, performance, risk and cost metrics must be selected in order for clear targets to be set, and for further monitoring of the results.

- **Metrics** are the specific parameters or functions used to quantitatively or qualitatively assess criteria; metrics can be indicators, indices or levels.

- **Targets** are the actual proposed values to be achieved for each metric within a given time frame (short, medium or long term).

As a consequence, a performance assessment system comprises a set of **performance assessment metrics** and related **data elements** that represent real instances of the

undertaking context. The classification of these data elements depends on the active role they play:

Data elements: A basic datum from the system that can either be measured from the field or is easily obtainable. Depending on their nature and role within the system, data elements can be considered variables, context information or simply explanatory factors.

Variables: A variable is a data element from the system that can be combined into processing rules in order to define the performance assessment metric. The complete variable consists of a value (resulting from a measurement or a record) expressed in a specific unit, and its reliability level (see section 5, Table 2) that indicates the quality of the data represented by the variable.

Performance assessment metrics: Measures of the efficiency or effectiveness of the delivery of the urban water services. Section 4.1 specifies the types of performance metrics that can be used and their characteristics. They should always be associated to objectives and assessment criteria.

Context information: Context information are data elements that provide information on the inherent characteristics of an undertaking and account for differences between systems. There are two possible types of context information:

- Information describing pure context and external factors to the management of the system. These data elements remain relatively constant through time (demographics, geography, etc.) and in any case are not affected by management decisions.

- Some data elements on the other hand are not modifiable by management decisions in the short or medium term, but the management policies can influence them in the long term (for instance the state of the infrastructure of the utility).

Context information is especially useful when comparing indicators from different systems.

Explanatory factors: An explanatory factor is any element of the system of performance indicators that can be used to explain PI values, i.e., the level of performance at the analysis stage. This includes PI, variables, context information and other data elements not playing an active role before the analysis stage.

The use of performance indicators should always be linked to the establishment of a proper system of performance indicators, in which all the above mentioned elements are present and defined, and aim to fulfil a clear objective or obtain information on specific areas or issues. The proposal in this manual represents in itself a complete system of performance indicators that can be used on an "as is" basis, completed with further elements or simplified through a selection of part of its elements to suit particular needs.

4.1. Types of performance assessment metrics used within TRUST

Assessment is defined as a "process, or result of this process, comparing a specified subject matter to relevant references" (ISO 24510: 2007; ISO 24511: 2007; ISO 24512: 2007).

Performance assessment is therefore any approach that allows evaluation of the efficiency or the effectiveness of a process or activity through the production of performance metrics. Performance metrics are the specific measures that are used to inform the assessment.

The types of performance assessment metrics that are recommended to be used within TRUST are the same as proposed by the Cost ActionC18 (Sjøvold et al. eds, 2008):

Performance indicators, which are quantitative efficiency or effectiveness measures of the activity of an utility. A performance indicator consists of a value (resulting from the evaluation of the "processing rule") expressed in specific units, and a confidence grade which indicates the quality of the data represented by the indicator. Performance Indicators are typically expressed as ratios between variables; these may be commensurate (e.g. %) or non-commensurate (e.g. $/m3). In the latter case, the denominator shall represent one dimension of the system (e.g. number of service connections; total mains length; annual costs), to allow for comparisons. The use of denominators of variables which may vary substantially from one year to another, particularly if not under the control of the undertaking, should be avoided (e.g. annual consumption, that may be affected by weather or other external reasons), unless the numerator varies in the same proportion. The information provided by a performance indicator is the result of a comparison (to a target value, previous values of the same indicator, or values of the same indicator from other undertakings) (Alegre et al., 2006; ISO 24500).

Performance indices, which are measures resulting from the combination of more disaggregated performance measures (e.g. weighted average of performance indicators), from analysis tools (e.g. simulation models, statistical tools, cost efficiency methods) or from scoring systems. In general, they aim at aggregating several perspectives into in a single metric. Compared to performance indicators, their main advantages are that they can be more aggregated measures and the can be used to assess future scenarios (e.g. using simulation results or statistical analyses). However, they have the disadvantages of being potentially more subjective and less auditable. Care should be taken to avoid this.

Performance levels, which are performance metrics of a qualitative nature, expressed in discrete categories (e.g. excellent, good, fair, poor). In general they are adopted when the use of quantitative metrics is not appropriate (e.g. evaluation of customer satisfaction by means of surveys).

4.2. Requirements for the definition of a performance assessment system

A good number of problems which originate in the use of performance indicators can be solved in advance at the definition stage of the PI system. Setting the objectives and constraints of the system is helpful when choosing and defining the indicators. Although the definition and selection of performance indicators is dealt with in the implementation chapter, there are a few principles for the elements of a PI system that should be taken into account at the definition stage.

4.3. Performance assessment metrics

Individually, a performance assessment metric (PAM) should comply with the following requirements:

- be relevant for the objectives of the UWCS;

- fit in the predefined assessment criteria:

- be clearly defined, with a concise meaning;

- be reasonably achievable (which mainly depends on the related variables);

- be auditable;

- be as universal as possible and provide a measure which is independent from the particular conditions of the utility;

- be simple and easy to understand; and

- be quantifiable so as to provide an objective measurement of the service, avoiding any personal or subjective appraisal.

- Collectively, PAMs should comply with the following requirements:

- every PAM should provide information significantly different from the other PAMs in the system;

- definitions of the PAMs should be unequivocal (this requirement is made extensive to its variables);

- only PAMs which are deemed essential for effective performance evaluation should be established.

4.4. Variables

Each variable should comply with the following requirements:

- definitions should be univocal;

- fit the definition of the PI they are used for;

- be reasonably achievable;

- refer to the same geographical area and the same period of time or reference date as the PI they will be used for;

- be as reliable and accurate as the decisions made based on them require.

Some of the variables in PAS are often obtained from external data, and their availability, accuracy, reference dates and limits of the corresponding geographical area are generally out of the control of the undertaking. In this case, variables should also comply with the following requirements:

- be collected, whenever possible, from official survey departments;

- be fundamental for the PAM assessment or interpretation; and

- collectively, be as few as possible.

4.5. Context information and other data elements

Context information and the rest of the data elements in the system (which are used as explanatory factors) should follow the same general principles as variables and performance indicators. However, the level of detail and confidence grading is usually not considered to be as high as the one required for PI and variables. Consequently, CI and the rest of the data elements should comply with:

- definitions should be univocal;

- be reasonably achievable;

- if external, be collected whenever possible from official survey departments;

- be fundamental for the PI interpretation; and

- collectively, be as few as possible.

5. DATA QUALITY

Performance metrics should always be associated with the quality of the data used to calculate them. Ideally, this should be assessed in terms of the reliability of the source and of the accuracy of data. However, practice has shown that in most practical situations it may not be easy to assess the accuracy of the data.

The reliability of the source accounts for uncertainties in how reliable the source of the data may be, i.e., the extent to which the data source yields consistent, stable, and uniform results over repeated observations or measurements under the same conditions each time.

Within TRUST, it is recommended that reliability of the input variables is well defined, according to the IWA PI guidelines, reproduced in section 4.3:

Table 2: Recommended data source reliability bands

RELIABILITY BAND	COMMENTS
★★★	Highly reliable data source: data based on sound records, procedures, investigations or analyses that are properly documented and recognised as the best available assessment methods.
★★	Fairly reliable data source: worse than ★★★, but better than ★.
★	Unreliable data source: data based on extrapolation from limited reliable samples or on informed guesses.

In Appendix 1, examples are provided to illustrate how these general concepts may be tailored for each specific variable.

In the case of the self-assessment tool developed within TRUST, no information on data quality is explicitly gathered. This contradicts the first statement in this section of the document. There is a practical reason behind this omission, and is related to the objective of reducing the time resources necessary to complete an assessment.

In practical terms, the lack of data quality information limits the usefulness of the tool for making decisions as well as the quality of the assessment. For this reason, the self-assessment tool should only be used as guidance and not as a final assessment. In any case, most of the performance metrics have been chosen to avoid data quality problems and should not present a problem for the average European utility.

6. PERFORMANCE METRICS SELECTION AND SCORING MODEL FOR THE SELF-ASSESSMENT TOOL

The self-assessment tool is based on a very simple scoring system, in which the values of the performance metrics are compared to reference values that are considered to be adequate towards the 2040 target. Given the limitations of the tool that have already been described in this document, the assessment is not provided for every single element, but rather grouped in objectives and dimensions. A three-level assessment scheme (green, yellow and red) has been designed to indicate readiness for the 2040 challenge. A green (good) assessment should not be understood as a sign that the city is already prepared, but is rather on the right track.

Although the selected metrics have been defined for the self-assessment tool according to the criteria previously stated, and with the context differences in mind, a few parts of the assessment should be taken with some caution in some contexts (specially performance indicator figures).

In addition to the three-level assessment, the tool will produce a system profile for the user. This is the reason why some of the provided metrics are not used to produce a score in the tool.

Table 3 displays the complete self-assessment system with all performance metrics, their corresponding dimension and objective and the scoring parameters to obtain the self-assessment.

SUSTAINABILITY DIMENSION	SUSTAINABILITY OBJECTIVE	SUSTAINABILITY CRITERIA	QUESTION OF SELF ASSESSMENT TOOL (SAT)	SCORING OF SELF ASSESSMENT TOOL (SAT)					
				REMARKS (IN ITALIC)	ANSWER YES [Y]	SCORE YES	ANSWER NO [N]	SCORE NO	SCORE INTERVAL P. QUESTION
Social (S)	S1) Access to urban water services	S11) Service coverage	**Water Supply**						
			1. Do you provide water supply services to households by networked services? (Clicking, the question about coverage appears)	*No score, automatic description*	repeat the question as answer in the brief report of the tool (text)				
			2. Do you provide water supply services via decentralised systems (Clicking, the question about coverage appears)	*No, s.above*	repeat the question as answer in the brief report of the tool (text)				
			3. Do you provide water supply services standpipes (Clicking, the question about coverage appears)	*No, s.above*	repeat the question as answer in the brief report of the tool (text)				
			Wastewater						
			4. Do you provide wastewater services to households including drainage and treatment? (Clicking, the question about coverage appears)	*No, s.above*	repeat the question as answer in the brief report of the tool (text)				
			5. Do you provide wastewater services to households including drainage only? (Clicking, the question about coverage appears)	*No, s.above*	repeat the question as answer in the brief report of the tool (text)				
			6. Do you provide on-site services? (Clicking, the question about coverage appears)	*No, s.above*	repeat the question as answer in the brief report of the tool (text)				
			(to be decided whether the IWA PIs should be used or just the coverage will be asked)						
	S2) Effectively satisfy the current users' needs and expectations	S21) Quality of service	**UWCS**						
			1. When you have interventions in the system do you inform the users in advance?		Y	1	N	0	[0 ; 1]
			List: public media (radio or tv)	*if one or several of answers (list) are given by Y => score: 1*					
			List: newspapers	*if one or several of answers (list) are given by Y => score: 1*					
			List: individually	*if one or several of answers (list) are given by Y => score: 1*					
			List: flyers	*if one or several of answers (list) are given by Y => score: 1*					

2. Do you have a customer service that ensures customers' information?	*take the highest score of one of the given answers*							[0 ; 3]
List: tariff information		Y	**1**	N	**0**		
List: complain management		Y	**2**	N	**0**		
List: customer satisfaction surveys		Y	**3**	N	**0**		
3. Do you have systematic proactive information or training activities for the society (e.g. site visits, training for students, brochures)?		Y	**1**	N	**0**		[0 ; 1]
4. Have you established a service agreement (implicit or explicit)with your registered users?		Y	**1**	N	**0**		[0 ; 1]
5. What is the percentage of users's complaints related to billing? (value of the bill; clarity of the invoice; ease of payment)	*This is difficult and depends on percentage, see IWA* *@Helena: are there experiences in portuguese regulation concerning ranges/intervals? I have no reliable data available*						
Water supply							
6. Do you have 7x24 supply? (Yes / no)	*either Y or N*	Y	-	N	**0**		[0 ; 4]
List if no, average number of supply periods per week is:	*take the highest score of one of the given answers*						
- once per day;		Y	**0**				
- more than once per week		Y	**0**				
- less or equal once per week		Y	**1**				
7. If yes, are supply interruptions an issue in your city?	*sum up the scores of the given answers*						
- Do you have records of the interruption location and time of occurrence?		Y	**1**	N	**0**		
- Do you have records of the interruption duration?		Y	**1**	N	**0**		
- Do you have records users affected?		Y	**1**	N	**0**		
- Do you have records on the cause of the interruption?		Y	**1**	N	**0**		

			Wastewater and storm water							
			8. Is flooding an issue in your city?				N	5	[0 ; 5]
			List if yes	*take the highest score of one of the given answers*					
			- For rain events occurring once a year or more		Y	0			
			- For rain events occurring every 2-5 years		Y	0			
			- For rain events occurring every 6-10 years		Y	0			
			- For rain events occurring every 11-25 years		Y	1			
			- Less than once every 25 years		Y	2			
			- Due to sewer blockages or collapses		Y	1			
			9. Information on flooding of properties	*sum up the scores of the given answers*					[0 ; 4]
			- Do you have records of the location and time of occurrence of flooding events?		Y	1	N	0	
			- Do you have records of the event duration?		Y	1	N	0	
			- Do you have records of the users affected?		Y	1	N	0	
			- Do you have records on the cause of the flooding?		Y	1	N	0	
	S22) Safety and health		1. Do you have safety management procedures that include the information, plans and solutions to maintain or restore service in the event of major incidents or natural disasters?		Y	1	N	0	[0 ; 1]
			2. Do you have crisis management procedures that include the information, plans and solutions to prepare, recover and restore service in the event of major incidents or natural disasters?		Y	1	N	0	[0 ; 1]
			Water supply						
			3. Do you have constraints on complying with water quality requirements? (yes / no)				N	4	[0 ; 4]
			List if yes	*sum up the scores of the given answers*					
			If yes: microbiological		Y	1			
			If yes: physico-chemical		Y	1			

If yes: aesthetic		Y	1			
If yes: radioactivity		Y	1			
4. Do you go beyond the legal requirements assessing other water quality issues?				N	0	[0 ; 3]
List if yes	*take the highest score of one of the given answers*					
in terms of research		Y	1			
in terms of monitoring		Y	2			
in terms of source protection treatment		Y	3			
5. Do you have implemented a water safety plan? (y/n)		Y	1	N	0	[0 ; 1]
6. Do you supply non-potable water (e.g.treated water. Imtreated raw water. Raom water)?		Y	1	N	0	[0 ; 2]
If yes:	*sum up the scores of the given answers*					
7. Do you have risk management procedures specific to these uses?		Y	1			
Wastewater and storm water						
3. Do you have constraints on complying with the discharge quality requirements? (yes / no)				N	0	[0 ; 2]
If yes:	*sum up the scores of the given answers*					
physico-chemical, e.g. pH, BOD, COD, TSS, N or P compounds, other		Y	1	N	0	
microbiological, e.g. coliform bacteria, protozoa, helminth eggs, other		Y	1	N	0	
4. Do you have constraints on complying with the quality requirements for water reuse? (yes / no)				N	0	[0 ; 2]
If yes:	*sum up the scores of the given answers*					
physico-chemical, e.g. pH, BOD, COD, TSS, TDS, N or P compounds, turbidity, electrical conductivity, Cl, Na, B, SAR, heavy metals		Y	1	N	0	
microbiological, e.g. coliform bacteria, protozoa, helminth eggs		Y	1	N	0	
5. Do you monitor intermittent overflow discharge?				N	0	[0 ; 2]
If yes:						
List 1: upstream pumping stations; upstream wastewater treatment plants; in every discharge point		Y	1	N	0	

		List 2: Do you monitor: frequency; volume; duration		Y	**1**	N	**0**	
		6. Do you have a risk management system?		Y	**1**	N	**0**	**[0 ; 1]**
S3) Acceptance and awareness of UWCS	S31) Affordability	**Water supply:** (Price of 120cu.m /year) / (net average family income/year) [%]	*Scores orientate at percentage of PI result*					
		Questionnaire:	*PI WS*	< 1%	**7**			**[0 ; 7]**
		1. Annual price of the first 120 m3 per year: _____ Euros	*input variable*	< 3 %	**3**			
		2. Annual price of a complete wastewater service (WW disposal and treatment, incl. SW mgt) according to European standards for a average household: _____ Euros	*input variable*	≥ 3%	**0**			
		3. Net Average family income: _____ Euros (use local value; if not available, use country value)	*input variable*					
		(Wastewater/storm water: Annual price of a complete WW/SW service/year) / (net average family income/year) [%]	*PI def WW/SW*	< 1%	**7**			**[0 ; 7]**
		Radio botton: (region or country) *to explain where the average income is from*		< 5 %	**3**			
				≥ 5%	**0**			

SUSTAINABILITY DIMENSION	SUSTAINABILITY OBJECTIVE	SUSTAINABILITY CRITERIA	QUESTION OF SELF ASSESSMENT TOOL (SAT)	SCORING OF SELF ASSESSMENT TOOL (SAT)					
				REMARKS (IN ITALIC)	ANSWER YES [Y]	SCORE YES	ANSWER NO [N]	SCORE NO	SCORE INTERVAL P. QUESTION
Environment (En)	En1) Efficient use of water, energy and materials	En11) Efficiency in the use of water (including final uses)	**Water Supply**						
			1. Have you implemented regular water balance audits?		Y	1	N	0	[0 ; 1]
			2. Do you have bulk metering in your system?				N	0	[0 ; 4]
			If yes:	*sum up the scores of the given answers*					
			Check box: in every source and entry point		Y	1			
			Check box: at every subsystem		Y	1			
			Check box: at district metering areas		Y	1			
			3. Do you carry out periodic maintenance of the meters?		Y	1	N	0	
			4. Do you meter your customers' consumption?				N	0	[0 ; 3]
			If yes:	*sum up the scores of the given answers*					
			Check box: generalised individual metering		Y	3			
			Check box: partial individual metring		Y	1			
			Check box: bulk (e.g. apartment building/ condominiums)		Y	1			
			5. Do you have active leakage control?		Y	1	N	0	[0 ; 1]
			6. When do replace your customers' meters?	*sum up the scores of the given answers*					[0 ; 3]
			Check box: after failure		Y	1			
			Check box: periodically		Y	2			
			Check box: based on economic/ technical studies		Y	2			
			7. Do you have procedures in place to manage water consumption?	*sum up the scores of the given answers*			N	0	[0 ; 5]
			Check box: public areas		Y	1			
			Check box: utility's own consumption		Y	1			
			Check box: domestic consumption		Y	1			

			Check box: commercial consumption			Y	**1**			
			Check box: industrial consumption			Y	**1**			
			8. Do you know your potential for water efficiency improvements in your service area?			Y	**1**	N	**0**	**[0 ; 1]**
			9. Do your rehabilitation plans include aspects of water loss reduction?			Y	**1**	N	**0**	**[0 ; 1]**
			10. Do the operational practices incorporate procedures to minimise water losses?			Y	**1**	N	**0**	**[0 ; 1]**
			Wastewater							
			1. Do you provide treated wastewater for reuse?	*local conditions are relevant - be careful and provide a disclaimer!!!*		Y	**1**	N	**0**	**[0 ; 1]**
			Check box: for the water utility's own use; for non-potable water uses (agricultural, environmental, industrial and or urban uses)	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)					
		En12) Efficiency in the use of energy	**Water supply**							
			1. Have you implemented regular energy audits?			Y	**1**	N	**0**	**[0 ; 1]**
			2. Do you know your potential for energy efficiency improvements in your service area?			Y	**1**	N	**0**	**[0 ; 1]**
			3. Do your rehabilitation plans include aspects of energy efficiency?			Y	**1**	N	**0**	**[0 ; 1]**
			4. Do the operational practices incorporate procedures to maximise energy savings?			Y	**1**	N	**0**	**[0 ; 1]**
			5. Do you recover or produce any form of green energy (e.g. solar; wind; hydro-power; heat changers, heat pumps)?			Y	**1**	N	**0**	**[0 ; 1]**
			6. Do you use more than 50% green energy for operation of your service?			Y	**1**	N	**0**	**[0 ; 1]**
			Wastewater							
			1. Have you implemented regular energy audits?			Y	**1**	N	**0**	**[0 ; 1]**
			2. Do you know your potential for energy efficiency improvements in your service area?			Y	**1**	N	**0**	**[0 ; 1]**

					Y	1	N	0	[0 ; 1]
			3. Do your rehabilitation plans include aspects of energy efficiency?		Y	1	N	0	[0 ; 1]
			4. Do the operational practices incorporate procedures to maximise energy savings?		Y	1	N	0	[0 ; 1]
			5. Do you recover or produce any form of green energy (e.g. solar; wind; hydro-power; heat changers, heat pumps)?		Y	1	N	0	[0 ; 1]
			6. Do you use more than 50% green energy for operation of your service?		Y	1	N	0	[0 ; 1]
			7. Do you have co-generation in your wastewater system?				N	0	[0 ; 2]
			If yes:	*take the highest score of one of the given answers*					
			Percentage of total energy consumption: 0-5%		Y	0			
			Percentage of total energy consumption: 5-20%		Y	1			
			Percentage of total energy consumption: more than 20%		Y	2			
		En13) Efficiency in the use of materials	**Water supply**						
			1. Is the use of chemicals in your treatment plants optimised in function of the actual inputs and target outputs?		Y	1	N	0	[0 ; 3]
			If yes,	*take the highest score of one of the given answers*					
			2. How do you optimise the use of chemicals? Dosage according to (check box):						
			- manufacturer's recommendations;		Y	1			
			- bibliography;		Y	1			
			- average own experience;		Y	2			
			- study of each specific treatment plant through: (sub-check boxes)		Y	3			
			¨ internal experts / ¨ external experts	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)				
			¨ lab studies /¨pilot studies / ¨field testing programmes						
			¨ seasonal testing and validation						

Wastewater

1. Is the use of chemicals in your treatment plants optimised in function of the actual inputs and target outputs?		Y	1	N	0	[0 ; 3]
If yes,	*take the highest score of one of the given answers*					
2. How do you optimise the use of chemicals? Dosage according to (check box):						
- manufacturer's recommendations;		Y	1			
- bibliography;		Y	1			
- average own experience;		Y	2			
- study of each specific treatment plant through: (sub-check boxes)		Y	3			
¨ internal experts / ¨ external experts ¨ lab studies /¨pilot studies / ¨field testing programmes ¨ seasonal testing and validation	*No score, automaticº description*	repeat the question as answer in the brief report of the activated boxes (text)				
3. Do you have nutrient recovery procedures?	*local conditions are relevant - be careful and provide a disclaimer!!!*			N	0	[0 ; 4]
If yes,	*take the highest score of one of the given answers*					
Check boxes: % of treated water: 0-25%		Y	1			
Check boxes: % of treated water: 25-50%		Y	2			
Check boxes: % of treated water: 50-75%		Y	3			
Check boxes: % of treated water: 75-100%		Y	4			

Water supply

4. Are there external requirements for in-site recycling?		Y	1	N	0	[0 ; 1]
If yes: under 25%; 25-50%; 50-75%; more than 75%)	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)				
5. Do you have procedures in place to ensure in-site recycling of construction materials?		Y	1	N	0	[0 ; 1]

			If yes: under 25%; 25-50%; 50-75%; more than 75%)	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)					
			6. What are the drivers for selecting the construction materials?		Y	**1**	N	**0**	**[0 ; 1]**
			Check box: investment cost; life cycle cost; functional capability; experience of use; technological requirements; quality requirements	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)					
			Wastewater							
			4. Are there external requirements for in-site recycling?		Y	**1**	N	**0**	**[0 ; 1]**
			If yes: under 25%; 25-50%; 50-75%; more than 75%)	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)					
			5. Do you have procedures in place to ensure in-site recycling of construction materials?		Y	**1**	N	**0**	**[0 ; 1]**
			If yes: under 25%; 25-50%; 50-75%; more than 75%)	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)					
			6. What are the drivers for selecting the construction materials?		Y	**1**	N	**0**	**[0 ; 1]**
			Check box: investment cost; life cycle cost; functional capability; experience of use; technological requirements; quality requirements	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)					
			Storm water							
			4. Are there external requirements for in-site recycling?		Y	**1**	N	**0**	**[0 ; 1]**
			If yes: under 25%; 25-50%; 50-75%; more than 75%)	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)					
			5. Do you have procedures in place to ensure in-site recycling of construction materials?		Y	**1**	N	**0**	**[0 ; 1]**

			If yes: under 25%; 25-50%; 50-75%; more than 75%)	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)				
			6. What are the drivers for selecting the construction materials?		Y	1	N	0	[0 ; 1]
			Check box: investment cost; life cycle cost; functional capability; experience of use; technological requirements; quality requirements	*No score, automatic description*	repeat the question as answer in the brief report of the activated boxes (text)				
	En2) Minimisation of other environmental impacts	En21) Environmental efficiency (resource exploitation and life cycle emissions to water, air and soil)	1. Have you performed life cycle assessment of your service?				N	0	[0 ; 2]
			If yes:	*take the highest score of one of the given answers*					
			for the whole area		Y	2			
			at a pilot scale or for parts the system		Y	1			
			2. Have you assessed a a negative environmental impact of your service?				N	0	[0 ; 2]
			If yes:	*take the highest score of one of the given answers*					
			for the whole area		Y	2			
			at a pilot scale or for parts the system		Y	1			
			3. Have you performed a carbon foot print assessment of your service?				N	0	[0 ; 2]
			If yes:	*take the highest score of one of the given answers*					
			for the whole area		Y	2			
			at a pilot scale or for parts the system		Y	1			

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				REMARKS (IN ITALIC)	ANSWER YES [Y]	SCORE YES	ANSWER NO [N]	SCORE NO	SCORE INTERVAL P. QUESTION
Economic (Ec)	Ec1) Ensure economic sutainability of the UWCS	Ec11) Cost recovery and reinvestment in UWCS (incl. cost financing)	**Water supply**						
			1. Can you clearly segregate the capital and the operating costs of the water supply service from the total organisation costs?		Y	1	N	0	[0 ; 1]
			2. What is the proportion of total costs covered by customers? (select from ranges)	*take the highest score of one of the given answers; PI result: ask for input data variables in the SAT*					[0 ; 3]
			Total cost ratio (IWA PI): FI30 = G1 / G4		> 1,2	3			
			Remark: Ask in the SAT for input variables with its IWA definitions: here G1 Total revenues (EUR) and G4 Total costs (EUR)		0.9 - 1.2	2			
					< 0.9	1			
					< 0.8	0			
			Wastewater / storm water						
			1. Can you clearly segregate the capital and the operating costs of the wastewater service from the total organisation costs?		Y	1	N	0	[0 ; 1]
			2. What is the proportion of total costs covered by customers? (select from ranges)	*take the highest score of one of the given answers; ask for input data variables in the SAT*					[0 ; 3]
			Total cost ratio (IWA PI): wFI30 = wG1 / wG5	*PI's calculated:*	> 1,2	3			
			Remark: Ask in the SAT for input variables with its IWA definitions: here wG1 Total revenues (EUR) and wG4 Total costs (EUR)		0.9 - 1.2	2			
			Remark: in most cases storm water costs are included in waste water revenues in mixed calculations => add this in the original definition		< 0.9	1			
					< 0.8	0			
		Ec12) Economic efficiency	**Water supply**						

Does your organisation have procedures in place to assess productivity?					N	0	[0 ; 5]
if yes:	*sum up the scores of the given answers*						
Check box: economic regulation		Y	1				
Check box: external efficiency controls from investors / lenders		Y	1				
Check box: participation in benchmarking initiatives, publishing of detailed cost information to the public		Y	1				
Check box: internal incentives for efficiency goals		Y	1				
Check box: efficiency audits		Y	1				

Wastewater

Does your organisation have procedures in place to assess productivity?					N	0	[0 ; 5]
if yes:	*sum up the scores of the given answers*						
Check box: economic regulation		Y	1				
Check box: external efficiency controls from investors / lenders		Y	1				
Check box: participation in benchmarking initiatives, publishing of detailed cost information to the public		Y	1				
Check box: internal incentives for efficiency goals		Y	1				
Check box: efficiency audits		Y	1				

Storm water

Does your organisation have procedures in place to assess productivity?					N	0	[0 ; 5]
if yes:	*sum up the scores of the given answers*						
Check box: economic regulation		Y	1				
Check box: external efficiency controls from investors / lenders		Y	1				
Check box: participation in benchmarking initiatives, publishing of detailed cost information to the public		Y	1				
Check box: internal incentives for efficiency goals		Y	1				
Check box: efficiency audits		Y	1				

Ec13) Leverage   **Water supply**

(degree of indebtedness)	What is your Debt service coverage ratio (DSC) in percent during the last 5 years?	*take the highest score of one of the given answers; PI result: ask for input data variables in the SAT*					
	Debt sercice coverage ratio (IWA PI): FI39 = G45 / G46 x 100		>150%	**5**	no answer	**0**	**[0 ; 5]**
	Remark: I suggest average data of the last 5 years to avoid single year peaks; here G45 cash-flow (EUR) and G46 financial debt service (EUR)		100% - 150%	**3**			
	Remark: this is a new definition, related to the IWA PI-manual, that must be explained in the definition of the input data variables		< 100%	**1**			
			> 80%	**0**			
	Wastewater						
	What is your Debt service coverage ratio (DSC) in percent during the last 5 years?	*take the highest score of one of the given answers; PI result: ask for input data variables in the SAT*					
	Debt sercice coverage ratio (IWA PI): wFI39 = wG41 / wG42 x 100		>150%	**5**	no answer	**0**	**[0 ; 5]**
	Remark: I suggest average data of the last 5 years to avoid single year peaks; here wG41 cash-flow (EUR) and wG42 financial debt service (EUR)		90% - 150%	**3**			
	Remark: this is a new definition, related to the IWA PI-manual, that must be explained in the definition of the input data variables		< 90%	**1**			
			> 70%	**0**			
Ec14) Willingness to pay (accounts receivable)	**Water supply**						
	Do you have delay in your accounts receivable?		Y	**0**	N	**4**	**[0 ; 4]**
	If yes:	*take the highest score of one of the given answers; PI result: ask for input data variables in the SAT*					
	What is your delay in accounts receivable (months equivalent) this year?		no data available	**0**			
	Delay in accounts receivable (IWA PI): FI32 = G38 / G3 x 12		> 3	**1**			
	Remark:Do you prefer average data of the last 5 years to avoid single year peaks or will it work with the original definition FI32? I think the original one will be fine.		≤ 2	**2**			
	Wastewater						

				Do you have delay in your accounts receivable?		Y	0	N	4	[0 ; 4]
				If yes:		*take the highest score of one of the given answers; PI result: ask for input data variables in the SAT*				
				What is your delay in accounts receivable (months equivalent) this year?		no data available	0			
				Delay in accounts receivable (IWA PI): wFI32 = wG34 / wG3 x 12		> 3	1			
				Remark:Do you prefer average data of the last 5 years to avoid single year peaks or will it work with the original definition FI32? I think the original one will be fine.		≤ 2	2			

SUSTAINABILITY DIMENSION	SUSTAINABILITY OBJECTIVE	SUSTAINABILITY CRITERIA	QUESTION OF SELF ASSESSMENT TOOL (SAT)	SCORING OF SELF ASSESSMENT TOOL (SAT)					
				REMARKS (IN ITALIC)	ANSWER YES [Y]	SCORE YES	ANSWER NO [N]	SCORE NO	SCORE INTERVAL P. QUESTION
Governance (G)	G1) Public participation	G11) Participation initiatives	1. Do you carry out systematic initiatives to determine users priorities regarding the service?				N	0	[0 ; 9]
			List if yes:	*differentiate the answers for the scoring*					
			2. (a) What type of initiatives?	*sum up the scores of the given answers*					
			- Market surveys		Y	1			
			- Permanent or systematic customer surveys		Y	1			
			- Complaint management system		Y	1			
			- Other systematic actions of auscultation and awareness		Y	1			
			(2.b) When did your last consultation initiative took place?	*take the highest score of one of the given answers*					
			- Permanently		Y	2			
			- Within the past quarter		Y	1			
			- Within the past semester		Y	1			
			- Within the past year		Y	1			
			- Within the last 5 years		Y	1			
			(2.c) How do you mainly use this information?	*take the highest score of one of the given answers*					
			- Just in very particular stress situations		Y	1			
			- For commercial, marketing or organizational image purposes		Y	1			
			- to adapt services organization to a better global costumer based service		Y	2			
			- to directly take them into account in your strategic decision-making process		Y	3			

		(2.d) In which of the previous situation did you used it last time?	*No score, automatic description*	repeat the answer in the brief report of the acivated boxes (text)				
		3. Are service users in your utility directly involved in meetings leading to key decisions (e.g. "going green";)		Y	**1**	N	**0**	**[0 ; 1]**
G2) Transparency and accountability	G21) Availability of information and public disclosure	1. Do you have reliable financial information internally readily available alltime (incl. accounting)?		Y	**1**	N	**0**	**[0 ; 1]**
		2. Is this information audited?		Y	**1**	N	**0**	**[0 ; 1]**
		3. Do you make selected financial information publicly available?	*Y means at least one check box is activated*	Y	**1**	N	**0**	**[0 ; 1]**
		(Check box: internet; newspapers; written documents distributed to customers)	*No score, automatic description*	repeat the answer in the brief report of the activated boxes (text)				
		4. Do you have reliable quality of service information internally readily available all time?		Y	**1**	N	**0**	**[0 ; 1]**
		5. Is this information audited?		Y	**1**	N	**0**	**[0 ; 1]**
		6. Do you make selected quality of service information publicly available via an easy to access means?	*Y means at least one check box is activated*	Y	**1**	N	**0**	**[0 ; 1]**
		(Check box: internet; newspapers; written documents distributes to customers)	*No score, automatic description*	repeat the answer in the brief report of the activated boxes (text)				
		7. Do you publish information beyond the legal or contractual requirements?	*Y means at least one check box is activated*	Y	**1**	N	**0**	**[0 ; 1]**
		(Check box: environment report; corporate responsibility report; quality of service report; customer satisfaction surveys, detailedaccounting aspects eg. tariff calculation, explanation of invoice components)	*No score, automatic description*	repeat the answer in the brief report of the activated boxes (text)				
	G22) Availability of mechanisms of accountability	1. Do you have cost type accounting?		Y	**2**	N	**0**	**[0 ; 2]**
		2. Do you have cost centre accounting?		Y	**2**	N	**0**	**[0 ; 2]**
		3. Do you have product cost accounting?		Y	**2**	N	**0**	**[0 ; 2]**

G3) Clearness, steadiness and measurability of the UWCS policies	G31) Clearness, steadiness and measurability of policies	1. Are there global policies related to UWCS clearly defined?				N	0	[0 ; 2]
		If yes:	take the highest score of one of the given answers					
		1 year		Y	0			
		5 years		Y	1			
		over 15 years		Y	2			
		2. Are your corporate objectives clearly stated? (yes/no; 1 year; 5 years; over 15 years)				N	0	[0 ; 2]
		If yes:	take the highest score of one of the given answers					
		1 year		Y	0			
		5 years		Y	1			
		over 15 years		Y	2			
		3. Are they well known by all staff?		Y	1	N	0	[0 ; 1]
		4. Do you have measures to assess them?		Y	1	N	0	[0 ; 1]
		5. Do you have targets associated to the stated objectives?		Y	1	N	0	[0 ; 1]
		6. Do you monitor the compliance?		Y	1	N	0	[0 ; 1]
		7. Do you have revision and continuous improvement procedures in place?		Y	1	N	0	[0 ; 1]
G4) Alignment of city, corporate and water resources planning	G41) Degree of alignment of city, corporate and water resources planning	1. Are there mechanisms to ensure alignment between city planning and UWCS planning?		Y	1	N	0	[0 ; 1]
		2. Are there mechanisms to ensure alignment between water resources planning and UWCS planning?		Y	1	N	0	[0 ; 1]
		3. Have you ever been asked to participate, and did participate, in any of the following more global strategic planning process ?	sum up the scores of the given answers			N	0	[0 ; 4]
		- city planning process		Y	1			
		- UWCS stakeholders planning process		Y	1			
		- consultant boards for legal/ formal requirement for regular UWCS coordination		Y	1			
		- UWCS licensing boards or processes		Y	1			
		4. Which of the following participations do you consider of most importance to ensure you a better integrated planning system for your activity:	sum up the scores of the given answers			N	0	[0 ; 4]

		- Direct participation in the city planning process		Y	**1**			
		- Direct participation in UWCS stakeholders planning process		Y	**1**			
		- Direct participation in consultant boards for legal/ formal requirement for regular UWCS coordination		Y	**1**			
		- Direct participation in UWCS licensing boards or processes		Y	**1**			

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				REMARKS (IN ITALIC)	ANSWER YES [Y]	SCORE YES	ANSWER NO [N]	SCORE NO	SCORE INTERVAL P. QUESTION
Assets (A)	A1) Infrastructure reliability, adequacy and resilience	A11) Adequacy of the rehabilitation rate	**Water supply**						
			1. Do you know the book value of your infrastructure?		Y	1	N	0	[0 ; 1]
			2. Do you know the fair value of your infrastructure?		Y	1	N	0	[0 ; 1]
			3. Do you have a multi-annual rehabilitation on plan for your assets?		Y	1	N	0	[0 ; 1]
			4. The rehabilitation rate in your plan was based only on the available budget?		Y	1	N	0	[0 ; 1]
			5. The rehabilitation rate in your plan was based on the average expected life of the assets?		Y	1	N	0	[0 ; 1]
			6. The renovation rate in your plan took into account the average expected life of the assets and the actual asset condition?		Y	1	N	0	
			7. Is at least 80% of the rehabilitation plan being implemented?		Y	1	N	0	[0 ; 1]
			Wastewater						
			1. Do you know the book value of your infrastructure?		Y	1	N	0	[0 ; 1]
			2. Do you know the fair value of your infrastructure?		Y	1	N	0	[0 ; 1]
			3. Do you have a multi-annual rehabilitation on plan for your assets?		Y	1	N	0	[0 ; 1]
			4. The rehabilitation rate in your plan was based only on the available budget?		Y	1	N	0	[0 ; 1]
			5. The rehabilitation rate in your plan was based on the average expected life of the assets?		Y	1	N	0	[0 ; 1]
			6. The renovation rate in your plan took into account the average expected life of the assets and the actual asset condition?		Y	1	N	0	
			7. Is at least 80% of the rehabilitation plan being implemented?		Y	1	N	0	[0 ; 1]

					Y	1	N	0	[0 ; 1]
			Storm water						
			1. Do you know the book value of your infrastructure?		Y	1	N	0	[0 ; 1]
			2. Do you know the fair value of your infrastructure?		Y	1	N	0	[0 ; 1]
			3. Do you have a multi-annual rehabilitation on plan for your assets?		Y	1	N	0	[0 ; 1]
			4. The rehabilitation rate in your plan was based only on the available budget?		Y	1	N	0	[0 ; 1]
			5. The rehabilitation rate in your plan was based on the average expected life of the assets?		Y	1	N	0	[0 ; 1]
			6. The renovation rate in your plan took into account the average expected life of the assets and the actual asset condition?		Y	1	N	0	[0 ; 1]
			7. Is at least 80% of the rehabilitation plan being implemented?		Y	1	N	0	[0 ; 1]
		A12) Reliability and failures	**Water supply**						
			1. Do you have reliable records of the failures and interventions in your systems?		Y	1	N	0	[0 ; 1]
			2. Are these records geographically located and integrated into your inventory system?		Y	1	N	0	[0 ; 1]
			3. Do you take this information directly into account in your rehabilitation activities?		Y	1	N	0	[0 ; 1]
			4. Have your critical infrastructures been clearly identified?		Y	1	N	0	[0 ; 1]
			5. Have you assessed the main risks associated to them?		Y	1	N	0	[0 ; 1]
			6. Do you take this information directly into account in your rehabilitation plan?		Y	1	N	0	[0 ; 1]
			7. Are there any relevant risks associated to the existing infrastructure that are not acceptable by stakeholders?		Y	1	N	0	[0 ; 1]
			Wastewater						
			1. Do you have reliable records of the failures and interventions in your systems?		Y	1	N	0	[0 ; 1]
			2. Are these records geographically located and integrated into your inventory system?		Y	1	N	0	[0 ; 1]
			3. Do you take this information directly into account in your rehabilitation activities?		Y	1	N	0	[0 ; 1]

					Y	1	N	0	
			4. Have your critical infrastructures been clearly identified?		Y	1	N	0	[0 ; 1]
			5. Have you assessed the main risks associated to them?		Y	1	N	0	[0 ; 1]
			6. Do you take this information directly into account in your rehabilitation plan?		Y	1	N	0	[0 ; 1]
			7. Are there any relevant risks associated to the existing infrastructure that are not acceptable by stakeholders?		Y	1	N	0	[0 ; 1]
			Storm water						
			1. Do you have reliable records of the failures and interventions in your systems?		Y	1	N	0	[0 ; 1]
			2. Are these records geographically located and integrated into your inventory system?		Y	1	N	0	[0 ; 1]
			3. Do you take this information directly into account in your rehabilitation activities?		Y	1	N	0	[0 ; 1]
			4. Have your critical infrastructures been clearly identified?		Y	1	N	0	[0 ; 1]
			5. Have you assessed the main risks associated to them?		Y	1	N	0	[0 ; 1]
			6. Do you take this information directly into account in your rehabilitation plan?		Y	1	N	0	[0 ; 1]
			7. Are there any relevant risks associated to the existing infrastructure that are not acceptable by stakeholders?		Y	1	N	0	[0 ; 1]
		A13) Adequacy of infrastructural capacity	1. Do your current water sources (incl. treated wastewater used, desalinated water, etc.) have sufficient capacity for the current and expected future needs in water supply?		Y	1	N	0	[0 ; 1]
			2. How would rate the hydraulic capacity of your infrastructure of **water supply**?	*take the highest score of one of the given answers*					[0 ; 3]
			lllll (a) clearly insufficient……. (e) Well above needs		(a)	0			
					(b)	0			
					(c)	1			
					(d)	2			
					(e)	3			

		2. How would rate the hydraulic capacity of your infrastructure of **wastewater** disposal?		*take the highest score of one of the given answers*					**[0 ; 3]**
		lllll (a) clearly insufficient……. (e) Well above needs		(a)	**0**			
				(b)	**0**			
				(c)	**1**			
				(d)	**2**			
				(e)	**3**			
		2. How would rate the hydraulic capacity of your infrastructure of **storm water** management?		*take the highest score of one of the given answers*					**[0 ; 3]**
		lllll (a) clearly insufficient……. (e) Well above needs		(a)	**0**			
				(b)	**0**			
				(c)	**1**			
				(d)	**2**			
				(e)	**3**			
		3. Do your **water supply** treatment facilities have the adequate capacity in terms of treated volume and treatment effectiveness, for the current and medium terms needs?		Y	**1**	N	**0**		**[0 ; 1]**
		3. Do your **wastewater** treatment facilities have the adequate capacity in terms of treated volume and treatment effectiveness, for the current and medium terms needs?		Y	**1**	N	**0**		**[0 ; 1]**
		3. Do your storm water facilities have the adequate capacity in terms of floodings and prevention effectiveness, for the current and medium terms needs?		Y	**1**	N	**0**		**[0 ; 1]**
		4. Do you take this information directly into account in your rehabilitation plans?		Y	**1**	N	**0**		**[0 ; 1]**
	A14) Adaptability to changes (e.g. climate change adaptation)	**Water supply**		*sum up the scores of the given answers*					
		1. Is your region subject (replies: yes, no or "I don't know)		Y	-	dont know	**0**		**[0 ; 3]**
		2. (active only if reply to question 1 is Yes): Has your organisation analysed their impact on your existing system?		Y	**1**	N	**0**		
		3. Have you built future scenarios in order to ensure an adequate system resilience? (activate 4 and 5 only if reply to question 3 is Yes)		Y	-	dont know	**0**		

4. Choose the factors taken into account in your scenario building (Check box: urban development; demography; rainfall events (flood or droughts); temperature; consumption habits; resources availability (water, energy, capital))		Y	1	N	0	
5. Are these scenarios considered in your rehabilitation plan?		Y	1	N	0	
Wastewater	*sum up the scores of the given answers*					
1. Is your region subject (replies: yes, no or "I don't know)		Y	-	dont know	0	[0 ; 3]
2. (active only if reply to question 1 is Yes): Has your organisation analysed their impact on your existing system?		Y	1	N	0	
3. Have you built future scenarios in order to ensure an adequate system resilience? (activate 4 and 5 only if reply to question 3 is Yes)		Y	-	dont know	0	
4. Choose the factors taken into account in your scenario building (Check box: urban development; demography; rainfall events (flood or droughts); temperature; consumption habits; resources availability (water, energy, capital))		Y	1	N	0	
5. Are these scenarios considered in your rehabilitation plan?		Y	1	N	0	
Storm water	*sum up the scores of the given answers*					
1. Is your region subject (replies: yes, no or "I don't know)		Y	-	dont know	0	[0 ; 3]
2. (active only if reply to question 1 is Yes): Has your organisation analysed their impact on your existing system?		Y	1	N	0	
3. Have you built future scenarios in order to ensure an adequate system resilience? (activate 4 and 5 only if reply to question 3 is Yes)		Y	-	dont know	0	
4. Choose the factors taken into account in your scenario building (Check box: urban development; demography; rainfall events (flood or droughts); temperature; consumption habits; resources availability (water, energy, capital))		Y	1	N	0	
5. Are these scenarios considered in your rehabilitation plan?		Y	1	N	0	

				Y	2	N	0	
A2) Human capital	A21) Adequacy of training, capacity building and knowledge transfer	Do you have a talent-based recruitment policy based on tailored integrated criteria (formal, informal and personal characteristics) to fulfil the organisation's actual needs?		Y	2	N	0	[0 ; 2]
		Checkbox: (yes, partially, no)	*take the highest score of one of the given answers*			partially	1	
		Do you regularly promote team-building initiatives (at least once yearly) ? (yes, no)		Y	1	N	0	[0 ; 1]
		Do you promote training and capacity-building activities oriented by organizational needs and collaborator's interests?		Y	2	N	0	[0 ; 2]
		Checkbox: (yes, partially, no)	*take the highest score of one of the given answers*			partially	1	
		Do you have active mechanisms to promote the incorporation of new capacities and learnings from your collaborators in your organization?		Y	2	N	0	[0 ; 2]
		Checkbox: (yes, partially, no)	*take the highest score of one of the given answers*			partially	1	
A3) Information and knowledge management	A31) Quality of the information and of the knowledge management system	1. Do you have processes in place that ensure that the information collected and managed correspond to the management / decision making needs?		Y	1	N	0	[0 ; 1]
		2. Procedures, methods and responsibilities for collection, analysis and evaluation are clearly defined and implemented and monitored?		Y	1	N	0	[0 ; 1]
		3. Employees and other stakeholders, including contracted service providers, have easy and timely access to the information relevant to their activities or responsibilities?		Y	1	N	0	[0 ; 1]

7. SELECTION OF PERFORMANCE ASSESSMENT METRICS WITHIN THE TRUST CONTEXT

As previously mentioned, the dimensions and criteria included represent a common view of sustainability and how to assess it from the project TRUST's perspective. However, the performance assessment metrics described in Table 3 may not be suitable for all purposes within TRUST. In order to guarantee that additional performance assessment systems are developed in a coherent and consistent manner within the project, these are the guidelines for selecting and using PAMs within the TRUST context:

 Select relevant objectives and corresponding assessment criteria

a) Start with the **objectives** and **criteria** recommended in this document (or updated versions of it)

b) If necessary, refine or complete the assessment criteria according to the specific needs.

[1] Check whether any of the PAMs offered by the self-assessment tool respond to your needs

- **Y:** select and use the relevant PAM(s) from the self-assessment list. Go to [5].

- **N:** Go to [2].

[2] Check whether any of the other PAMs included in the TRUST PAS database respond to your needs

- **Y:** select and use the relevant PAM(s) from the TRUST PAS database. Go to [5].

- **N:** Go to [3].

[3] Check whether any of the PIs of the IWA PI systems (Alegre et al., 2006; Matos et al., 2003) respond to your needs.

- **Y:** select and use the relevant PAM(s) from the TRUST PAS database. Go to [5].

- **N:** Go to [4]

[4] Search in other sources. Check whether there are available PAMs that respond to your needs and comply with the requirements contained in this document.

- **Y**: fill-in Table 4; fill-in the PAM form and the corresponding variables form; submit it to the WP3.1 leader for consistency check and approval to be included in the TRUST PAMs database. Go to [5].

- **N:** Create your own PAMs, according to the guidelines specified in sections 4.1, 4.2 and 5 of this document.

[5] Establish targets and use the set of PAMs

[6] Define the key context information and explanatory factors that you consider to be essential for the analysis and interpretation of the results.

Whenever the selection process reaches item [4], it means that a new performance metrics is to be potentially added to the TRUST PAMs database. In this case, the following table shall be filled in:

Table 4. Template for new performance assessment metrics within TRUST

OBJECTIVE	ASSESSMENT CRITERIA	PERFORMANCE METRICS		
		Type (Indicator, index or level)	Name	Unit

Additionally, a form similar to the examples provided in the Appendices 1 and 2 needs to be fulfilled for each new PAM, and, when applicable, to its input variables.

The incorporation of the proposed metrics in overall TRUST PAMs database needs a consistency check by the WP31 team and the approval by WP3.1 leader. The proposal of new metrics shall be submitted to the WP3.1 leader with a short justification for its need and the forms referred.

8. IMPLEMENTATION. THE TRUST SELF-ASSESSMENT TOOL

The TRUST self-assessment tool represents the online version of the system presented in this document. It represents a live system that will be updated throughout the project and will be maintained online for at least 5 years after the end of TRUST. In its current version the system collects all the information required by the performance assessment metrics described above, and calculates the corresponding score.

Figure 2: Data input in the self-assessment tool

Figure 3: Results screen. Self-assessment tool

The self-assessment tool is a self-explanatory software that allows an easy interaction from the user.

Visitors can create an account in the tool, so progress is saved allowing returning later to complete the questionnaire. The Graphic user interface (Figure 1) has been designed to facilitate the understanding of the tool's structure, and questions.

Users can check their progress and intermediate assessment at any time (see Figure 2) providing real time feedback to encourage a complete assessment of the city.

Version 1.1 of the tool is already being developed, and it will include:

- Summary report in PDF
- Recommendations of TRUST products depending on the assessment
- New graphic design according to the new TRUST web design

The TRUST self-assessment tool can be accessed at:

http://self-assessment.trust-i.net

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TRANSITIONS TO THE URBAN WATER SERVICES OF TOMORROW

Framework for Sustainability
Assessment of UWCS and development
of a self-assessment tool **D 31.1**

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