

D53.1b

MANUAL 3

Strategic
planning of
urban water
services at
utility level



X
4-3-1-2

Strategic planning of urban water services at utility level

Authors:

Helena Alegre, LNEC – National Civil Engineering Laboratory
Dídia Covas, IST – Instituto Superior Técnico, Universidade de Lisboa,
Portugal

Reviewers:

Sveinung Sægrov, NTNU – Norges Teknisk-Naturvitenskapelige Universitet
Rita Salgado Brito, LNEC – National Civil Engineering Laboratory

April 2015

The research leading to these results has received funds from European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n.º 265122.

This publication reflects only the authors' and other contributors' views and the European Union is not liable for any use that may be made of the information contained therein.

Cite as

Alegre, H., Covas, D., (2015). Strategic planning of urban water services at utility level TRUST Manual of Best Practice, Vol. 3.

Table of contents

Introduction.....	3
1.1 Scope	3
1.2 Document structure.....	4
Greg’s story	5
2.1 The key question	8
2.2 Solution adopted	8
Step 1 –Strategic objectives definition.....	8
Step 2 – Assessment criteria definition and relative importance.	9
Step 3 – Metrics and reference value definition.....	12
Step 4 - Diagnosis.....	16
Step 5 – Intervention alternatives.....	19
2.3 Lessons learned.....	24
Guidelines for the development of a Strategic Infrastructure Asset Management Plan for urban water systems	25
3.1 Strategic planning in the IAM planning process	25
3.2 The PDCA cycle in strategic planning.....	31
3.3 Content of a strategic plan.....	37
3.4 Key elements of a strategic plan	38
Cover	38
Integrated planning	39
Executive summary.....	40
Utility and system profiles.....	41
Plan scope and time horizon.....	42
Vision and mission of the organization.....	42
Objectives, criteria, metrics and targets.....	43
Scenario definition	48
Strategic level diagnosis	50

Infrastructure asset management strategies.....	53
Resourcing.....	54
Monitoring and revision of the strategic plan	54
References	55
References	56
APPENDIX: Template for a Strategic IAM Plan	i
Integrated planning	iv
List of symbols	v
List of acronyms.....	vi
Table of contents.....	vii
Table of tables	x
1. Executive summary.....	1
2. Utility characterization.....	1
3. Plan scope and horizon.....	1
4. Utility vision and mission	1
5.Objectives, criteria, metrics, reference values and targets.....	2
6.Diagnosis	4
7.Infrastructure asset management strategies.....	6
8. Resources needed for the IAM Plan implementation.....	7
9. Monitoring and revision of the IAM Strategic Plan.....	9
10. References.....	10
Appendices	11



Introduction

Structuring common sense ideas into transparent, accountable and forward-looking plan.

1

1.1 Scope

The scope of this TRUST series of best practice manuals is the integrated planning of urban water services, focusing on **Infrastructure Asset Management (IAM)**. IAM aims at ensuring that infrastructures are managed in such a way that sustainability of the service is ensured by maximizing service performance at the minimum cost and with acceptable risk levels, in the long term. Urban water services include water supply and wastewater and storm water management.

This manual provides guidance on the strategic planning process that utilities need to carry out in order to ensure sustainable water services in the long term.

This is third volume of a series of manuals developed in scope of the TRUST project (www.trust-i.net). Manual 1 introduces the trust global framework for managing urban water services. The other volumes include specific guidelines for policy-making at a national or regional level (Manual 2) and for tactical planning at the utility level (Manual 4) as well as a portfolio of rehabilitation techniques used in supply water

pipes and storage tanks and drainage systems (Manuals 5 and 6).

1.2 Document structure

The document has three chapters and an appendix, being the first chapter the present introductory chapter.

Chapter 2 presents the story of a new strategic planner, Greg, at a leading edge city that faces the challenge of a rapid population growth. It aims at providing case-based learning process.

Chapter 3 explains the main principles and procedures of strategic planning of urban water services, which is a generalization of the rational adopted by Greg in his specific city.

The appendix reproduces a template of a strategic plan, developed and adopted by many utilities in the framework of the previous and on-going projects, AWARE-P, TRUST and iGPI.

.



Greg's story

Struggling among alternative strategies at my utility

2



Who is Greg?

I am a new strategic planner at a mid-size urban water utility. I was appointed to develop the "**utility strategic plan**" in the pillars related to infrastructure asset management of the water supply services, aiming at the long term service sustainability.



How is Greg's utility?

Good levels of the service are provided to users. However, the existing water supply infrastructure shows aging symptoms due to a demanding climatic context (freezing temperatures) and high leakage levels. Availability of water has not been a problem, but the city is a sprawling area, and the forecasted population growth for the coming decade brings an added challenge: the current water sources are insufficient to supply the medium term demand, at least if the current per capita consumption and the real losses levels are not significantly reduced. A new water source is needed.

There are financial resources, but the efficiency of their use needs to be demonstrated. The choice of the best option shall be guided by sustainability objectives.



What was Greg struggling about when he started?

When I assumed the role as a strategic planner at the utility, there were already multiple strong and competing opinions about the strategy that the utility should follow.

In short, my challenges were, in the stage of the project, how to deal with: many stakeholders; multiple coexisting assessment criteria and processes; not-straight forward best options; and lack of clear and systematic decision making process. Typically, in these cases, “the loudest voice tends to win.”

"We have enough water to meet demand needs.

If we want to sustainable, the critical factor is to be economically efficient.

We must reduce our non-revenue water by controlling water losses."

"We need to be pragmatic. The easiest and most effective solution is to expand the capacity of existing reservoir and treatment facility."

"We are too vulnerable with a single source; thus, we must have new complementary water sources exploring the local aquifers."



"We want to be sustainable. We must use our treated wastewater as an alternative water source, for instance, for irrigation and street washing. "

"Our infrastructure is sufficient for our needs. We should not spend our investment capacity in new assets. The most important is to ensure that the existing infrastructure does not continue aging. We need to increase our rehabilitation rate."



2.1 The key question

The question was how to choose the best strategies that meet the long term service sustainability. My experience tells me that the only sound solution in these cases is to implement a planning process that is **transparent** and **defendable**, yet **simple**!

2.2 Solution adopted

As a strategic planner, I know that for a planning process to be transparent, defendable and simple, it is essential to have:

- Very clear corporate strategic objectives, aligned with the organization's vision and mission.
- Clear metrics and targets for specifying the strategic objectives in a concrete way and for monitoring the results.
- A consensus among the stakeholders about the objectives and the assessment system prior to start comparing strategies.
- A system approach to our analyses, instead of addressing independently individual assets.

The subsequent set of steps was followed, as explained below.

Step 1 – Strategic objectives definition

The board of directors and the main stakeholders met and they decided to adopt the TRUST Sustainability Objectives [[Brattebø et al, 2013](#)] as a good basis for work:

Social

- S2) Effectively satisfy the current users' needs and expectations
- S3) Acceptance and awareness of UWCS

Environment

- En1) Efficient use of water, energy and materials
- En2) Minimisation of other environmental impacts

Economic

- Ec1) Ensure economic sustainability of the UWCS

Assets

- I1) Infrastructure reliability, adequacy and resilience

Some of the TRUST objectives have been recognised as very important in themselves, but not relevant for our case, or at least not in the core of the decision to be made about the choice of a new water source. These were the Social objective S1) Access to urban water services, the Governance objectives 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, and the Assets objectives I2) Human capital and I3) Information and knowledge management.

Step 2 – Assessment criteria definition and relative importance

The strategic objectives referred are clear enough to understand what are the key directions; however, they are too vague to compare alternative strategies and to monitor the effects of implementing the selected strategies.

Therefore, we felt the need to define metrics and targets adequate to assess the objectives. As an intermediate stage to help in the process, we agreed on key assessment criteria for

each objective, based once more in the TRUST sustainability recommendation (Brattebø et al., 2013).

Some of the TRUST criteria have not been considered relevant to analyse and compare source alternatives and for this reason were discarded. In one case a new criteria was added.

The table shows in bold the adopted TRUST criteria and in brown the new added criteria. This task was carried out by the stakeholders' group for all the objectives.

	OBJECTIVE	CRITERIA
Social	S1) Access to urban water services	S11) Service coverage
	S2) Effectively satisfy the current users' needs and expectations	S21) Quality of service S22) Safety and health
	S3) Acceptance and awareness of UWCS	S31) Affordability S3X) Public acceptability to change
Environment	En1) Efficient use of water, energy and materials	En11) Efficiency in the use of water En12) Efficiency in the use of energy En13) Efficiency in the use of materials
	En2) Minimisation of other environmental impacts	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 Ec12) Economic efficiency Ec13) Leverage (degree of indebtedness) Ec14) Willingness to pay (accounts receivable)

	OBJECTIVE	CRITERIA
Governance	G1) Public participation	G11) Participation initiatives
	G2) Transparency and accountability	G21) Availability of information and public disclosure G22) Availability of mechanisms of accountability
	G3) Clearness, steadiness and measurability of the UWCS policies	G31) Clearness, steadiness, ambitiousness and measurability of policies
	G4) Alignment of city, corporate and water resources planning	G41) Degree of alignment of city, corporate and water resources planning
Assets	I1) Infrastructure reliability, adequacy and resilience	I11) Adequacy of the rehabilitation rate I12) Reliability and failures I13) Adequacy of infrastructural capacity I14) Adaptability to changes (e.g. climate change adaptation)
	I2) Human capital	I21) Adequacy of training, capacity building and knowledge transfer
	I3) Information and knowledge management	I31) Quality of the information and of the knowledge management system

All of these criteria were carefully defined. For instance:

- Reliability and failures

This criterion refers to major service failures.

- Adaptability to changes

This criterion refers to ability of the infrastructure to deliver the target service when subject to changes in the external context (e.g., demographic, environmental, economic, climate).

Step 3 – Metrics and reference value definition

When a consensus about the key assessment criteria was reached, a set of metrics was defined as well as the respective targets in the short, medium and long term. For instance for the criterion “Adequacy of the maintenance infrastructure value”, the chosen metrics were:



ASSESSMENT CRITERIA	METRIC	UNIT
S21) Quality of service	Service complaints	(No.)
	Bulk supply interruptions	(No./ delivery point /year)
S22) Safety and health	Quality of supplied water	(%)
	Risk of failing water quality targets	(-) (1-3)
S 3x)Public acceptability to change	Public acceptability to change (Px)	(-) (1-3)
En12) Efficiency in the use of energy	Efficiency in the use of energy	kWh/m ³ revenue water
En11) Efficiency in the use of water (including final uses)	Inefficiency of use of water resources	(%)
En21) Environmental efficiency (resource exploitation and life cycle emissions to water, air and soil)	Non-revenue water by volume	(%)
Ec12) Economic efficiency	Economic efficiency index (-)	(-) (1-3)
I11) Adequacy of the rehabilitation rate	Infrastructure Value Index	(-) (0-1)
I12) Reliability and failures	Mains failures	(No./100 km/year)
I14) Adaptability to change	Resilience Index	(-) (1-3)

This process was carried out to all criteria, including the accurate definition of metrics, their reference values and their source.

Several metrics are performance indicators from IWA's PI system, such as:

- Service complaints (QS26);
- Non-revenue water by volume (Fi46);
- Real losses per mains length (l/ km /day) (Op28);
- Mains failures (n.^o/100 km/year) (Op31).

As the relative importance that stakeholders give to the metrics is similar, all have the standard weight of 1. The only exception is water losses. It was considered very important, but two metrics are included (non-revenue water and real losses). For this combined reasons, a weight of 0.75 was allocated to each of them.

After completing metrics definition, a judgement of the values of each metric was agreed among stakeholders.

For instance for IVI, and given that a mature well maintained infrastructure will have an IVI of about 0.50, stakeholders consider that IVI are good, if above 0.45. They also considered as poor, if below 0.3.

To structure, document and simplify the decision process, I have decided to use the PLAN tool of the TRUST/AWARE-P system and software, as shown in the figure. This system converts any metric in a value ranging from 0-3, where 0 stands for the 'no function' and 3 means 'excellent'. Three grades of colours are used.

Edit metric

Code

Name

Description
 Total electrical energy supplied to the system / volume of revenue water (ref.: one year).
 A specific energy consumption indicator as been adopted because it is easy to assess and is valid for the aim: to compare different alternatives to serve the same population.

Exclusion condition: red in this metric will make alternative red overall

Weight

Reference values

Custom yearly weight/importance

CANCEL DELETE SAVE

In this process, I understood that there is an important difference, however, between this judgement and the establishment of short, medium and long-term targets. For the case of IVI, for instance, we have set up the targets shown in the following table, taking into account the baseline and the resources that could be mobilised by my utility.

	BASELINE	SHORT TERM TARGET (BASELINE+1 YEAR)	MEDIUM-TERM TARGET (BASELINE+5 YEAR)	LONG-TERM TARGET (BASELINE+20 YEARS)
Infrastructure value index	0.32	0.32	0.35	0.50

The infrastructure is globally aged, with an IVI falling already in the “red” grade. Capital maintenance levels are currently rather low as well. There is, therefore, the need to have a period of high capital maintenance levels that allow recovering from the current deficit, progressively tending to steady value as soon as an IVI of the order of 0.50 is reached.

With the consensus among stakeholders about the full definition of objectives, assessment criteria and corresponding metrics, reference values and short, medium and long-term targets, the assessment framework to be adopted from now onward in our utility has been consolidated.

Step 4 - Diagnosis

We started the diagnosis with a characterization of the baseline situation, using our assessment system, and proceeded with a SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis. Extract of the main results are summarised in the table below:

INTERNAL FACTORS	EXTERNAL FACTORS
<p>Strengths:</p> <ul style="list-style-type: none"> Good quality of service Competent staff 	<p>Opportunities:</p> <ul style="list-style-type: none"> Awareness of the society for the need for improving the service’s (& system’s) sustainability The water consumption in the city seems to be higher than in other cities in the region, with room for reductions
<p>Weaknesses:</p> <ul style="list-style-type: none"> High leakage levels Aged distribution network 	<p>Threats:</p> <ul style="list-style-type: none"> Population growth Climate change

One important aspect I realized is that stakeholders easily forgot the agreed objectives while identifying the strengths, weaknesses, opportunities and threats, tending to compile lists uncritically and without clear prioritization. We have learnt that it is fundamental that the SWOT analysis effectively identifies the most relevant factors in achieving the objectives, to help establishing our strategies.

The importance of individual SWOTs will be revealed by the value of the strategies they generate. A SWOT item that produces valuable strategies is important. A SWOT item that generates no strategies is not important.

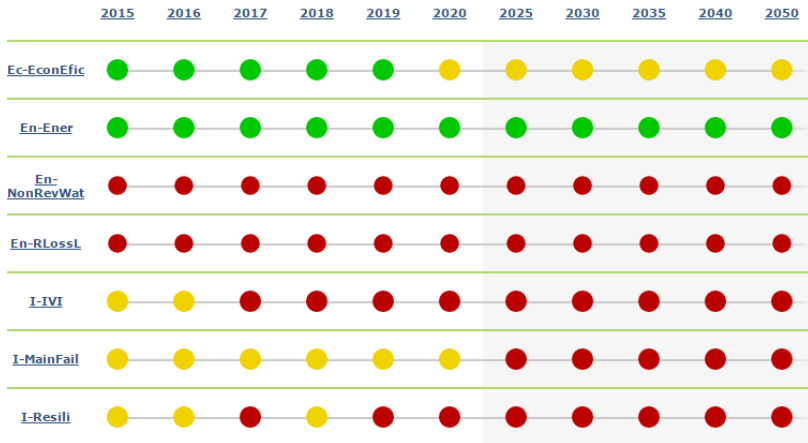
The trust/AWARE-P Plan tool was used to assess the current situation:

<u>Ec-</u> EconEfic	<u>En-Ener</u>	<u>En-</u> NonRevWat	<u>En-</u> RLossL	<u>I-IVI</u>	<u>I-MainFail</u>	<u>I-Resili</u>	<u>S-</u> Complain	<u>S-PubAcc</u>	<u>S-</u> RWatQual	<u>S-SupFail</u>	<u>S-</u> Watqual
●	●	●	●	●	●	●	●	●	●	●	●

This information, however, does not reflect the impact of the forecasted population growth, and we used our best tools (i.e. hydraulic simulation, statistical analysis of past records) and expertise (e.g. Delphi Method) to forecast the evolution of all the metrics at a *statu quo* situation. We assumed that no change in rehabilitation policy, in operational procedures and in water sources would occur, in order to establish a baseline situation. Results were:

BASELINE SITUATION	2015	2016	2017	2018	2019	2020	2025	2030	2035	2040	2050
Economic efficiency index (-)	2.5	2.4	2.3	2.2	2.1	2	1.9	1.8	1.7	1.6	1.5
Efficiency in the use of energy (kWh/m ³ revenue water)	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4
Non-revenue water by volume (AA08/Fi46)	35	36	37	38	39	40	41	42	43	44	45
Real losses per mains length (L/km /day) (AA13a & Op28)	41	43	45	46	48	50	52	54	56	58	60
Infrastructure Value Index	.32	.30	.30	.28	.27	.26	.25	.24	.22	.21	.20
Mains failures (n.º/100 km/year) (AA11 & Op31)	40	42	44	46	48	50	52	54	56	58	60
Resilience Index (-)	1.5	1.3	1	1.2	0.5	0.5	0.4	0.4	0.3	0.3	0.3
Service complaints (QS26)	0.5	0.6	0.7	0.9	1	3	5	6	7	9	10
Public acceptability to change (Px)	2.1	2	2	2	2	2	2	2	2	2	2
Risk of failing water quality targets (-)	3.0	2.5	2	2	1.8	1.5	1.5	1	1	1	1
Bulk supply interruptions (No./ delivery point /year) (AA03a)	0	.00 7	.02	.03	.05	.06	.07	.08	.09	.10	.15
Quality of supplied water (-)	98	98	98	98	98	98	98	98	98	98	98

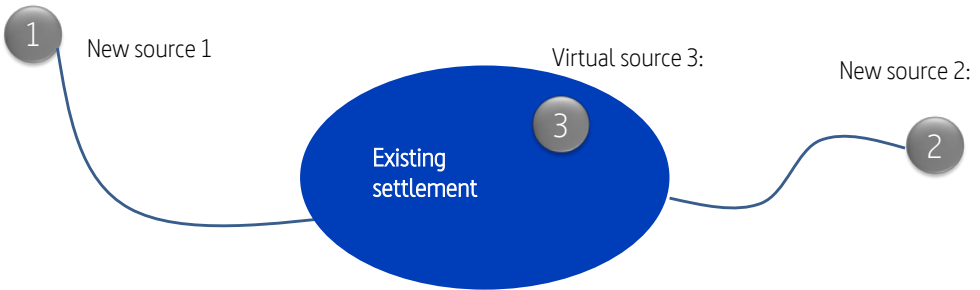
Although all necessary information was available, it is difficult to understand and communicate its essence. We used the Plan tool once again to represent this information in graphical form:



Step 5 – Intervention alternatives

In general terms, the definition of intervention alternatives should follow the diagnosis. In my case, however, several intervention alternatives had been studied and the technical feasibility of a subset of three basic ones had been demonstrated. This was, in fact, the point in time when I got this job. A good characterization of the situation existed, although not an objective-criteria-metrics – based diagnosis.

These alternatives, illustrated in the figure, are:



Alternative of intervention 1 – New source 1

- 120 km away
- Very good water quality
- Significant surplus in quantity
- Located at a low elevation: considerable pumping is needed

Alternative of intervention 2 – New source 2

- 30 km away
- Lower pumping head needed
- Fair raw water quality
- Enough quantity
- Closer to the expected expansion area

Alternative of intervention 3 – Virtual source

- Decrease in water losses
- Decrease in per capita consumption

The supporters of each of the alternatives used their own criteria to defend their position. As all of them are feasible and are of different nature, particularly Alternatives 1 & 2 versus Alternative 3, some of these criteria are not applicable to all.

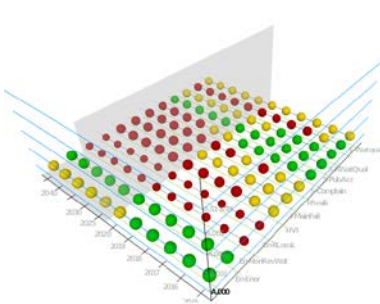
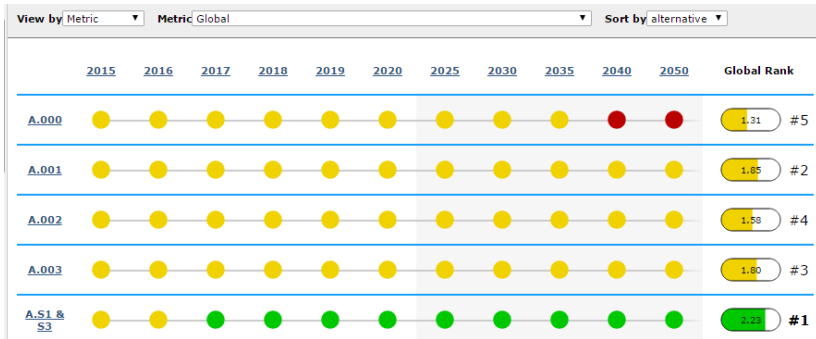
If I need to choose between buying a pair of shoes and a shirt, I cannot use the quality of the sole or the design of the collar to support my choice. Instead, I need to understand what are the most important aspects and to see how each one of these objectives contributes more for my personal objectives.

The same rational should be used in this case: we cannot use criteria that are related to the alternatives' own characteristics, but to the outcomes in terms of the service quality over time and of the service sustainability.

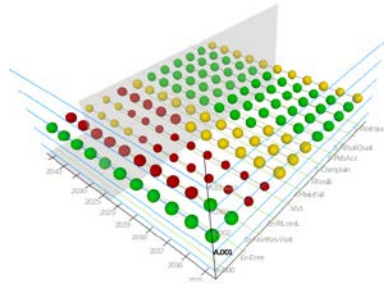
The good news are that when we reached this point of the process we already had a sound assessment system that we could apply. Once again we used our best methods, tools and expertise, including the TRUST / AWARE-P PI tool, the Financial Project, the IVI tool, the network simulator and the Financial Project (see baseform.org > aware-p for more information).

We input the results in the PLAN project where we had already defined the assessment system and uploaded the baseline alternative.

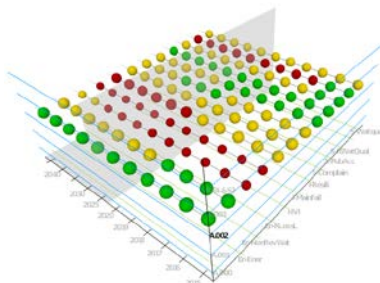
I am pleased to share some of the results:



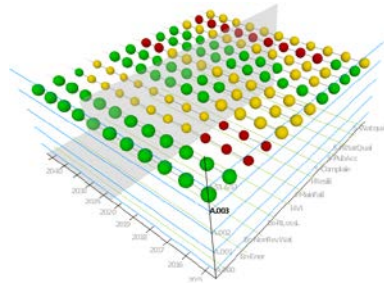
Baseline



New Source 1

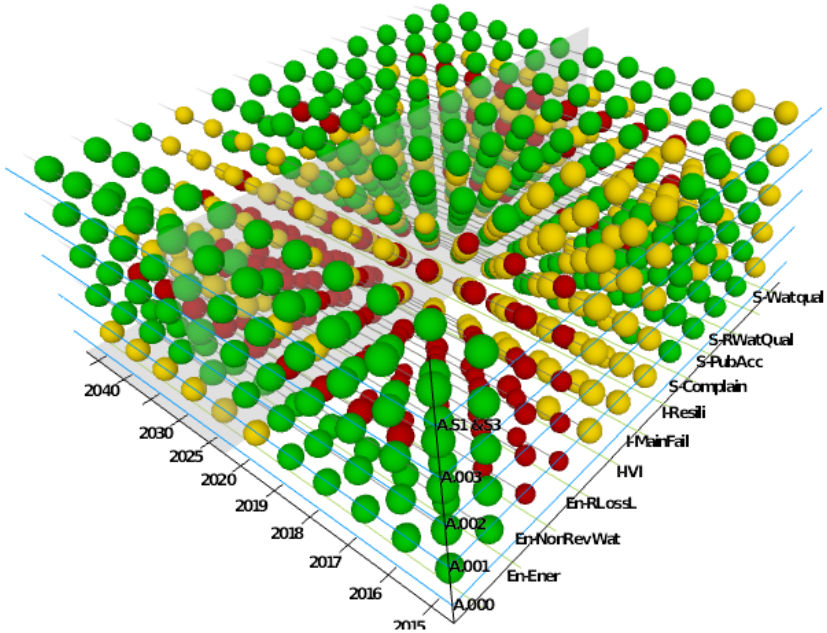


New Source 2



Virtual Source 3

Or, if seen all at the same time:

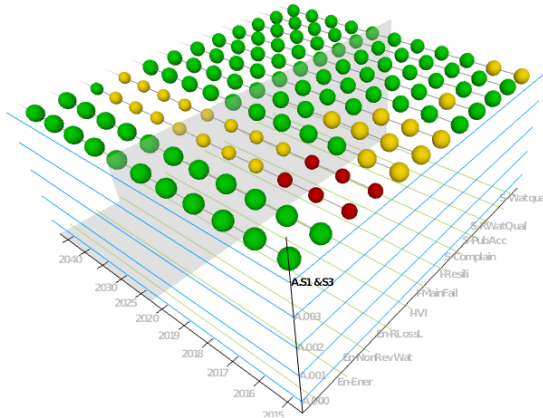


The analysis of these results has clearly shown us that all alternatives had comparative advantages and disadvantages.

Alternative 1, for instance, was globally well ranked, but from the point of view of IVI, energy consumption and some other aspects, it has some shortcomings.

Alternative 3, on the other hand, performs better for these aspects, but very poorly with regard to resilience. After an in-depth analysis, we agreed to test a new alternative, resulting from the combination between 1 and 3.

Results are promising, showing that most issues are sorted out:



The red balls correspond to an unsatisfactory performance in terms of the two water losses indicators, while the planned measures (e.g., including pipe rehabilitation, district metering area implementation, pressure management) are not yet fully into effect.

2.3 Lessons learned

If I were to summarise in three short sentences the lessons learnt during this process, I would say that:

- A clear vision is needed
- Strategic decisions shall be supported on a sound assessment systems composed of objectives-assessment criteria-metrics-reference values.
- The decision process needs to be is transparent and defensible, yet simple!



Guidelines for the development of a Strategic Infrastructure Asset Management Plan for urban water systems

3

3.1 Strategic planning in the IAM planning process

This chapter provides guidelines for the development of a strategic plan for infrastructure asset management of urban water services. This strategic plan is based on the methodological approach developed in the AWARE-P project (www.aware-p.org) and first presented in the *Technical Guides on Infrastructure Asset Management* published by ERSAR, LNEC and IST (Alegre and Covas, 2010; Almeida and Cardoso, 2010).

The cube shown in Figure 1 represents the AWARE-P approach. It advocates that IAM must be addressed at different planning decisional levels:

- a **strategic level**, driven by corporate and long term views and aimed at establishing and communicating strategic priorities to staff and citizens;
- a **tactical level**, where the intermediate managers in charge of the infrastructures need to select what the best medium-term intervention solutions are;
- and an **operational level**, where the short-term actions are planned and implemented.

It also draws attention to the need for standardised procedures to assess intervention alternatives in terms of performance, risk and cost, over the analysis period.

The other relevant message is that IAM requires three main pillars of competence: business management, engineering and information.

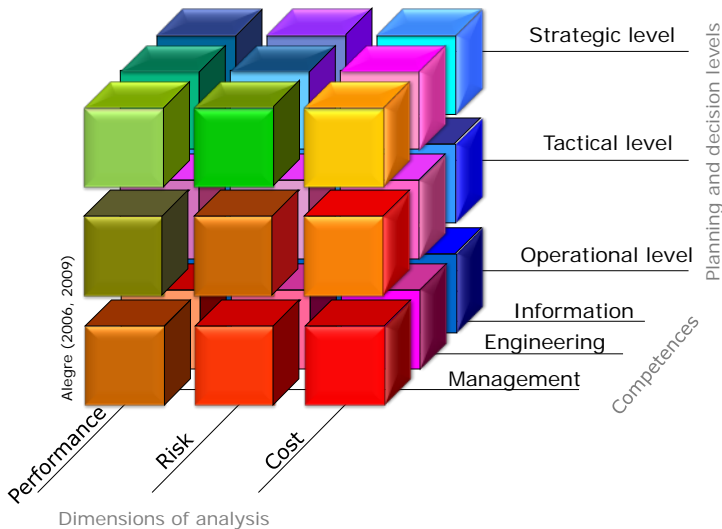


Figure 1 – The AWARE-P approach

At each level of management and planning – strategic, tactical and operational – a structured loop (Figure 2) is proposed that comprises the following stages:

- (i) definition of objectives and targets;
- (ii) diagnosis;
- (iii) plan production, including the identification, comparison and selection of alternative solutions;
- (iv) plan implementation;
- (v) and monitoring and review.

Most utilities already have several elements of this process in place. What is often missing is a review mechanism – a way to measure compliance with set goals – as well as an effective alignment between the different management levels.

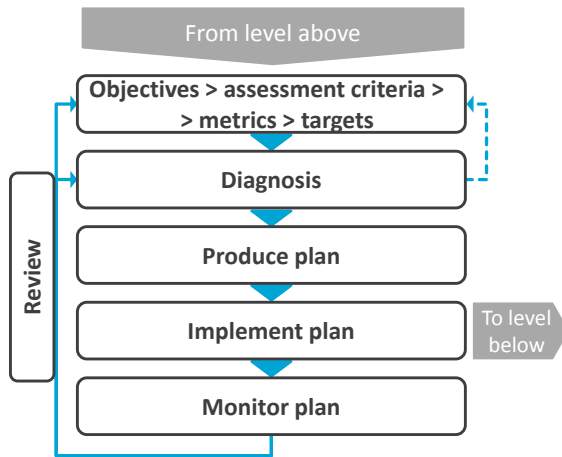


Figure 2 – The planning process (at each planning level)

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. Clarifying the four distinct but sequential concepts:

- **Objectives** are the goals that the organization aims to achieve. The AWARE-P approach, in accordance with the ISO 24510:2007, 24511:2007, 24512:2007 and EN 752:2008 standards, demands that objectives 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.
- **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).

For instance: for an objective of **environmental sustainability**, one possible criterion could be **water usage efficiency**, measured through a **real losses per service connection (l/conn./day)** metric, for which a target of **100 l/conn./day** might be chosen.

Assessment metrics are a key element of the whole process: they are used to establish targets, to set up a diagnosis, to compare and select alternative courses of action, and to monitor and review the process. They should be relevant, reliable, simple, and effectively measure success. Objectives and targets are also a powerful means of communication within the organisation and with other stakeholders.

As illustrated in Figure 3, the process cascades through the decisional levels within the organization's management structure. The global approach is based on plan-do-check-act (PDCA) principles aiming at the continuous improvement of the IAM process. The strategic planning is part of this overall structure.

The key notions in this process are **alignment**, **feedback**, **involvement** and **empowerment**.

- **Alignment** among strategic, tactical and operational objectives and targets is paramount in ensuring that efforts and resources are not wasted in the long run. In other words, making the best out of limited resources cannot be achieved without smart alignment across the utility.
- **Bottom-up feedback** is crucial because alignment cannot be assured through a top-down process alone. It is fundamental to have feedback mechanisms within each level, as well as between levels.
- People are the key element in this process. First of all, top management must be engaged in the shift of paradigm to an integrated IAM approach. It is equally important to ensure the **involvement** of the entire organization, from the CEO to the asset operators, and the **empowerment** of the staff, in order to promote leadership, co-ordination, collaboration, corporate culture acceptance, motivation, commitment and corporate know-how.

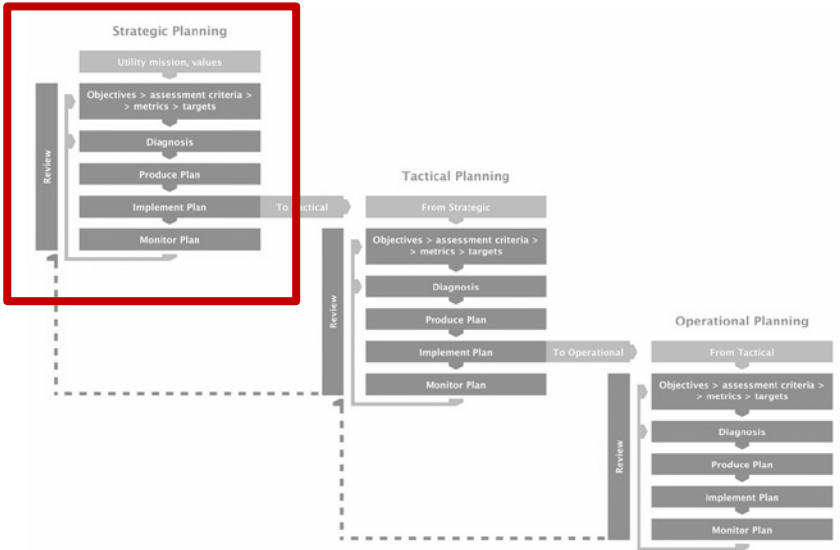


Figure 3 – Interlinks, alignment and feedback mechanisms between IAM planning levels

The aim of strategic IAM planning is to define the strategies that will support the decision-making process in the long-term and involve the wider scope of the entire organization. This is achieved through the identification of key internal and external factors that influence its performance. This planning process is unique to each utility and covers all strategic directions of the organization's activity. It should be developed by a multidisciplinary team and embraced by the whole utility.

IAM strategic planning takes shape in long-term strategies that lead to the success of the organization as an urban water service provider. It transforms the immediate client demand for service availability and quality into long-term strategies that will allow that demand to be consistently met.

Together with the strategic plan structure model, ways of developing its different components are also suggested. When relevant, examples are used to illustrate the drafting of a strategic plan.

These guidelines are a companion to a TRUST recommended template for an IAM Strategic Plan, coherent with ISO 55000:2014 standards and with IWA recommendations (Alegre et al, 2006).

3.2 The PDCA cycle in strategic planning

The PDCA (**Plan-Do-Check-Act**) cycle, also known as the **Stewart cycle** or **Deming cycle**, aims to support the improvement process of organizations, assuring that this process is development in a coherent, structured and systematic way.

The PDCA cycle has been adopted in the standardization framework associated to management systems, namely related to quality (ISO 9001:2008), to environment (ISO 14000: 2004), to energy efficiency (ISO 50001:2011) and to asset management (ISO 55001:2014).

The PDCA cycle consists of four different stages: plan, do, check and act.

At a strategic level, the initial stage (plan) consists of the definition of the strategic objectives and targets, the development of the diagnosis (e.g., using SWOT analysis) and the establishment of strategies. Afterwards (at the 'do' stage), the strategic plan is implemented according to the established strategies. In the third stage, the level of implementation and the results of the strategies are assessed. Finally, the strategic plan is reviewed based on the assessment of the previous

stage. This last stage is the starting point for the application of a new PDCA cycle.

Figure 4 depicts the schematic of the PDCA cycle. Table 1 summarises the different stages of the PDCA cycle.

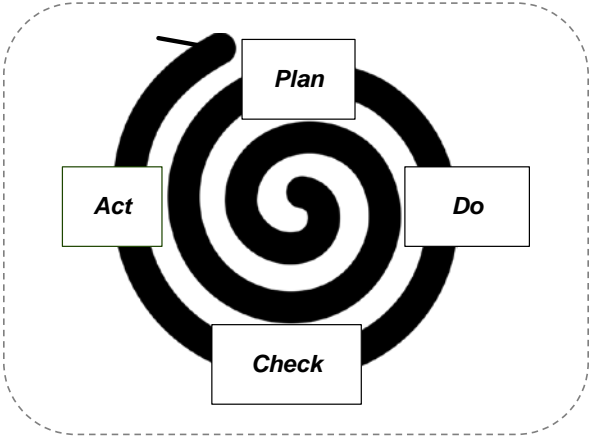


Figure 4 – PDCA Cycle

TABLE 1– STAGES OF THE PDCA CYCLE

STAGE	KEY-STEPS
<p>Plan</p>	<p>Identification of strategic objectives and assessment system establishment</p> <p>Strategic objectives are defined aligned with the corporate vision and mission. An assessment system that includes assessment criteria, metrics and reference values is established.</p> <p>Diagnosis development</p> <p>The diagnosis is essential to identify the main problems and the associated causes that should be solved in the scope of the improvement process. The baseline situation and a projection of the future situation for the <i>statu quo</i> is carried out based on a SWOT analysis (Strengths, Weakness, Opportunities and threats). The medium and long term targets associated to the assessment system metrics are established based on the diagnosis results.</p> <p>Plan production</p> <p>The plan production includes the establishment, analysis and selection of strategic strategies: the plan should define the processes, the responsibilities and the resources needed to attain the established targets, being a guide for the continuous improvement process.</p>
<p>Do</p>	<p>Plan implementation</p> <p>The implementation of the plan requires the individual and organizational capacitation of the involved teams. All members of the organization should be aware of their role and duties in the improvement process.</p>
<p>Check</p>	<p>Monitoring and control</p> <p>The evaluation process includes the plan monitoring based on collected data and the calculation of assessment metrics. The aim is the assessment of the level of implementation of the strategies as well as of the results of the plan. This will generate information that will allow the plan review, being essential for the PDCA process.</p>
<p>Act</p>	<p>Plan review</p> <p>This stage consists of making the necessary adjustments in the plan (or in the strategic strategies) in order to correct observed deviations from expected results. This stage allows the preparation of the new PDCA cycle.</p>

The organization should define where to be in the time horizon, looking at the changing process as an improvement process with successive cycles. In each cycle, objectives should be increasingly more ambitious than in the previous ones. In this way the organization maturity increases over time (Figure 5).

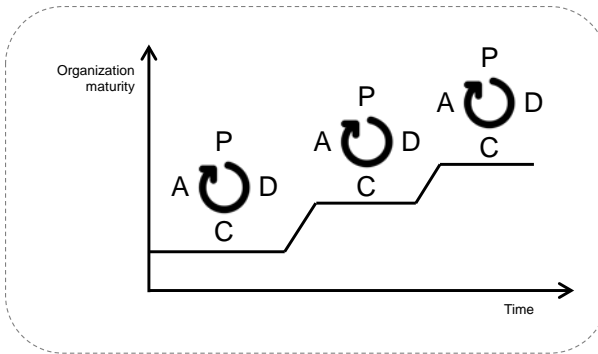


Figure 5 – Continuous improvement process through the application of several PDCA cycles

IAM is a cross-cutting process within the organization: planning, O&M, accounting and financing, customer service, are all fundamental pillars. A key success factor for the implementation of the IAM process within the organization is the perfect alignment and communication between the key organizational processes, as well as between decisional levels (strategic, tactical and operational).

CEO's direct engagement and commitment is another critical factor. Implementing an integrated IAM process requires changes in mind-sets, processes and organizational culture. The CEO must lead this transition path within the organisation. From a practical point of view, the IAM process needs to be executively managed by an appointed person and

team, with clear roles and responsibilities. In general, this person is a middle manager within the organization's hierarchy. A middle manager cannot, by nature of the typically hierarchical structure of organizations, set up or change procedures and responsibilities regarding processes under the responsibility of other middle managers. All these changes need to be endorsed to the Top Management and cascaded down within the organization as appropriate. This is another major reason that requires the CEO's direct engagement and commitment.

The ISO 5500x standards put a lot of emphasis on leadership, authority, clarity of roles and accountability, as well as on documented information (Figure 6). The whole process needs to be transparent and auditable. This requires the establishment and maintenance of communication and capacitation channels within the organization; communication between the utility and the users is also a determinant success factor for the continuous improvement processes because an outcome-directed IAM requires understanding and corresponding to the users' needs and expectations.

The implementation of the IAM plans needs to be monitored, and results analysed and communicated to all stakeholders (e.g., organisation's personnel, shareholders, service users, regulators). Deviations from set targets have to be detected, analysed and processed in order to resolve them.

Plans' periodic revision is also necessary. Procedures, periodicity and responsibilities need to be clearly defined.

Figure 7 depicts the key questions to be addressed in the strategic plan.

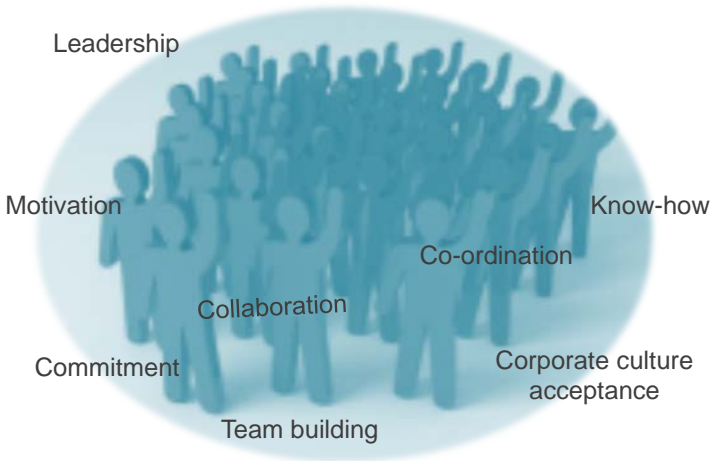


Figure 6 – IAM is all about people

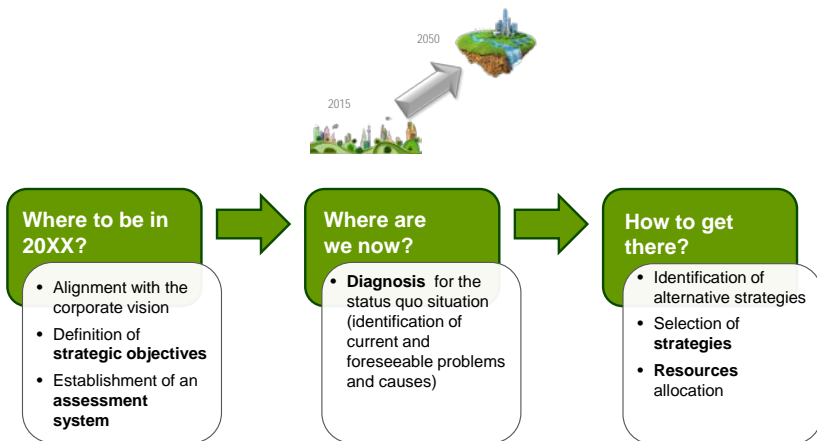


Figure 7 – “Must have” in any strategic plan

3.3 Content of a strategic plan

While strategic planning is a process specific of each organization, a Strategic IAM Plan should include the following elements:

- organization vision and mission;
- strategic objectives, criteria, metrics, reference values and goals;
- scenario definition;
- diagnosis:
 - evaluation of reference situation;
 - strengths, weaknesses, opportunities and threats (SWOT);
- adopted strategies;
- procedures for the plan's monitoring, evaluation and revision.

3.4 Key elements of a strategic plan

The following are relevant elements to consider when developing an IAM strategic plan.

Cover

If the IAM planning includes formal plans for each decision level (strategic, tactical and operational), the cover of these documents should clearly identify (Figure 8):

- the utility;
- the urban water system or service;
- the type of document;
- the planning horizon;
- the date of publication.

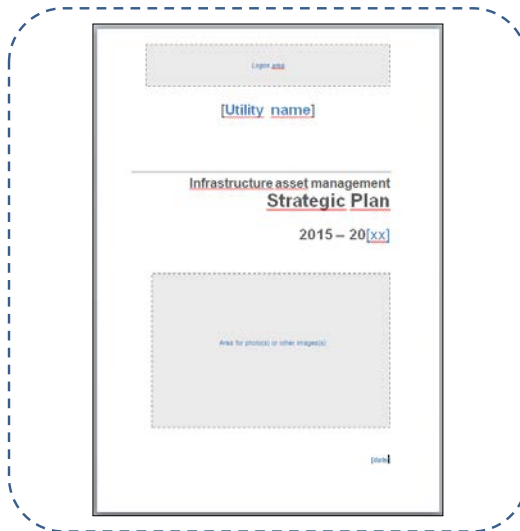


Figure 8 - Example for a Strategic Plan cover

Integrated planning

The IAM plan is part of the overall planning of an organization. Mentioning the different planning instruments that guide the utility's performance and drawing a map of the existing links between different types and levels of planning allows an easier understanding of the role played by IAM in the overall planning landscape (Figure 9).

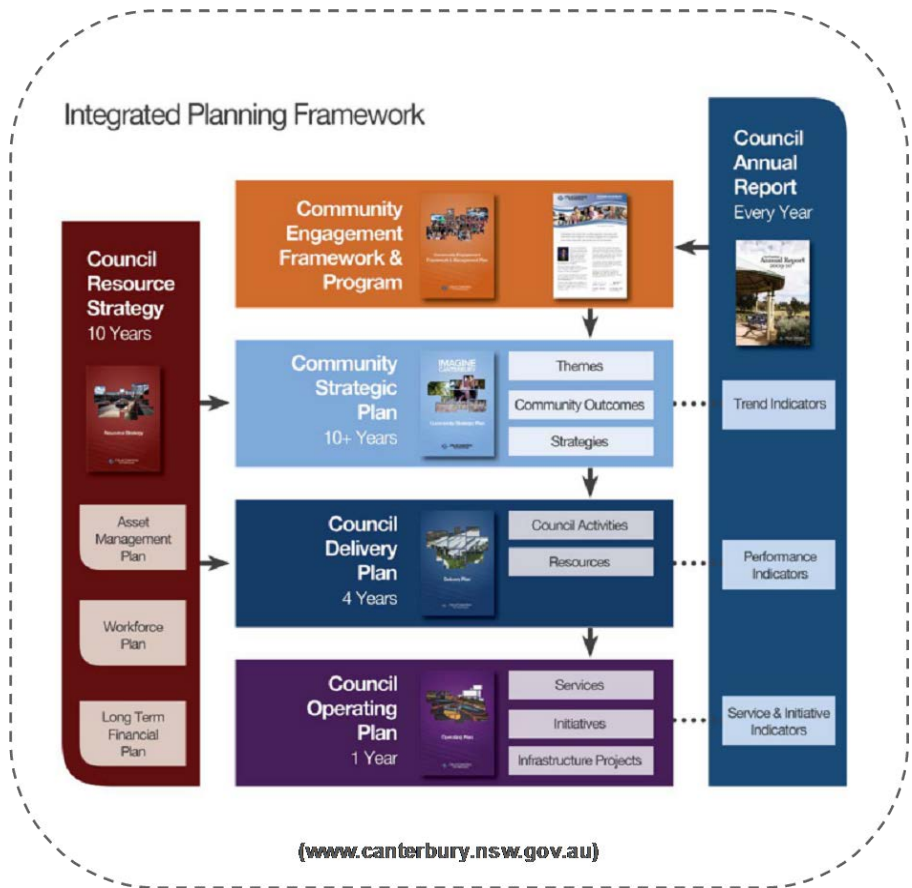


Figure 9 - Integrated planning example: City of Canterbury, Australia

Executive summary

The executive summary introduces the system for which the IAM plan is being drawn and the utility service provided. The reader should be given information on the strategic planning objectives and their relation to the overall IAM plan.

Executive Summary

AquaSan utility is responsible for supplying drinking water and managing wastewater and stormwater of the Lusitania region. It is mostly a publicly management system, with a PPP for the wastewater treatment.

The 2015 – 2050 Strategic Plan outlines XYZ utility’s strategic objectives, targets and strategies to fulfil the commitments established in the Community and Environment Policy that will drive social, financial and environmental improvements for the organization.

The plan has three primary objectives that address the key responsibilities to the community and the environment: (i) Effectively satisfy the current users’ needs and expectations; (ii) Efficiently use water, energy and materials; (iii) Ensure economic sustainability; (iv) Ensure infrastructure reliability, adequacy and resilience; (v) Ensure transparency and accountability.

The **main weaknesses** are related to the current capital maintenance deficit and with the high carbon foot print and high leakage rates. The main causes are the inadequate system design and operations and the poor condition of the aging infrastructure. Funding opportunities exist to stimulate the decrease of GHG emissions.

One strategy is the improvement in energy efficiency in the drinking water network, focusing primarily on subsystems where poor design and poor asset condition coexist.

Another strategy is the renewal of wastewater treatment plants, aiming at reducing GHG emissions in the treatment process, recovering energy from sludge digestion, and ensuring the treated water use for irrigation.

[...]

The utility will publicly report annual progress of the implementation of this ...

Figure 10 – Example of contents of an Executive Summary

Utility and system profiles

The utility and system profiles should be characterized in a synthetic way taking into account the parameters recommended by IWA Manuals of Best Practice on Performance Indicators for Wastewater and Waste Supply Services (Alegre et al., 2006; Matos et al., 2003), as exemplified in Figure 11. It should also provide information on potential certifications obtained by the utility.

Utility profile	
Geographical scope	Lusitania region
Type of activity	Water supply, wastewater and storm water
Type of asset ownership	Public
Type of operations	Mixed
Households served	45 000
Authorized consumption	5.5 Mm ³ /year
Collected wastewater	4.0 Mm ³ /year
Treated wastewater	3.5 Mm ³ /year
System profile (water supply)	
Number of water intakes	3 (surface) + 3 (ground)
Number of water treatment plants	3
Drinking water network length	500 km
Service connections density	30 connections/km
No. of pumping stations	40
No. of storage tanks (capacity)	30 (2 days)
Treated wastewater	3.5 Mm ³ /year
System profile (wastewater)	
...	...

Figure 11 – Example of a utility and system profile

Plan scope and time horizon

An IAM strategic plan is global in scope, encompassing the entire organization as well as the covered geographic area. In general, this plan spans a long-term time horizon.

Vision and mission of the organization

The vision establishes the core values of the organization and should encapsulate the future as well as define what success looks like.

The mission is a general description of the organization's nature and purpose and should be clear, concise and easy to understand, as well as being part of the mindset of all employees.

Mission Statement (Water Utility)

To provide safe and reliable water, meeting customers' needs and expectations and regulatory standards at reasonable rates.

Vision Statement (Water Utility)

To provide the highest quality water, customer service and stewardship of the critical infrastructure, fiscal, and natural resources entrusted to our care, enhancing public health and safety and contributing to the economic viability and liveability of the metropolitan region.

Figure 12 – Example of a mission and Vision statements

Objectives, criteria, metrics, reference values and targets

Establishing 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, within a given time frame (short, medium or long-term) (ISO 24510:2007, 24511:2007, 24512:2007).

Strategic objective

Strategic objectives are long-term organizational goals, broadly defined, that help to convert a mission statement from a broad vision into more specific intentions and that an organization must achieve to make its strategy succeed. Strategic objectives should be ambitious, pragmatic, feasible mutually compatible and measurable.

For each strategic objective, service assessment criteria should be selected in accordance with the requirements of interest as determined by stakeholders taking into account local conditions.

Table 2 presents the objectives and criteria established within TRUST for each of the five dimensions of sustainability of the urban water cycle services (UWCS).

TABLE 2 – OBJECTIVES AND CRITERIA OF THE UWCS SUSTAINABILITY DIMENSIONS (BRATTEBØ ET AL., 2013).

DIMENSION	OBJECTIVES	ASSESSMENT CRITERIA
Social	<p>S1) Access to urban water services</p> <p>S2) Effectively satisfy the current users' needs and expectations</p> <p>S3) Acceptance and awareness of UWCS</p>	<p>S11) Service coverage</p> <p>S21) Quality of service</p> <p>S22) Safety and health</p> <p>S31) Affordability</p>
Environment	<p>En1) Efficient use of water, energy and materials</p> <p>En2) Minimisation of other environmental impacts</p>	<p>En11) Efficiency in the use of water (including final uses)</p> <p>En12) Efficiency in the use of energy</p> <p>En13) Efficiency in the use of materials</p> <p>En21) Environmental efficiency (resource exploitation and life cycle emissions to water, air and soil)</p>
Economic	<p>Ec1) Ensure economic sustainability of the UWCS</p>	<p>Ec11) Cost recovery and reinvestment in UWCS (incl. cost financing)</p> <p>Ec12) Economic efficiency</p> <p>Ec13) Leverage (degree of indebtedness)</p> <p>Ec14) Willingness to pay</p>
Governance	<p>G1) Public participation</p> <p>G2) Transparency and accountability</p> <p>G3) Clearness, steadiness and measurability of the UWCS policies</p> <p>G4) Alignment of city, corporate and water resources planning</p>	<p>G11) Participation initiatives</p> <p>G21) Availability of information and public disclosure</p> <p>G22) Availability of mechanisms of accountability</p> <p>G31) Clearness, steadiness, ambitiousness and measurability of policies</p> <p>G41) Degree of alignment of city, corporate and water resources planning</p>

DIMENSION	OBJECTIVES	ASSESSMENT CRITERIA
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

Applying assessment criteria is carried out by defining metrics that should be complementary, mutually exclusive and as objective and accurate as possible. Metrics and targets are an essential basis for establishing the diagnosis, prioritizing intervention solutions and monitoring the results.

As a working basis for selecting performance metrics, the following indicator libraries are suggested:

- AWARE-P PI (available in www.baseform.org);
- IWA (Matos et al., 2004 and Alegre et al., 2004);
- Key Performance Indicators for Government and Non Profit Agencies: Implementing Winning KPIS by David Parmenter.

The number of metrics should be as limited as possible. The indicator library corresponding to each metric should be referred in the tables included in the Strategic Plan. In the event that metrics are defined by the utility, their specification should be presented.

Once the evaluation metrics are defined, the desired reference values and goals up to the strategic planning horizon (t_N) should be established.

One or more intermediate points should be set in time for the evaluation of system performance, along with the establishment of intermediate targets.

Figure 13 presents an example of several assessment criteria for different objectives.

Objectives	Criteria
Adequacy of the service provided	Service accessibility Quality of service provided to customers
Sustainability of the service provision	Economic sustainability Infrastructural sustainability Physical productivity of human resources
Environmental sustainability	Efficient use of environmental resources Efficiency in pollution prevention

Figure 13 – Example of assessment criteria for different strategic objectives

Figure 14 presents a list of metrics for each assessment criteria of the strategic objective “Adequacy of the service provided”, the corresponding values for the baseline situation and medium and long term targets.

Objectives	Criteria	Metrics	Reference values *	Baseline	Targets	
				2015	2020	2050
Adequacy of the service provided	Service accessibility	Physical accessibility of the service	80-95	95	100	100
		Economical accessibility of the service	0.5-1.0	0.5	0.3	0.25
	Quality of service provided to customers	Service interruptions	2.5-1.0	0.2	0.1	0
		Quality of supplied water	94.5-98.5	100	100	100
		Reply to written suggestions and complaints	85-100	100	100	100

*The limit on the left refers to a poor performance and the limit on the right to a good performance. The values in between refer to a fair performance.

Figure 14 – Example of metrics and targets of a water supply utility at a strategic level

Scenario definition

Under the AWARE-P methodology, the term “scenario” means the set of factors not controlled by the utility that have the potential to influence performance during the period under review.

Scenarios are a way to represent the uncertainty associated with the evolution of the external environment in which the organization operates.

The need to consider different scenarios during the planning process can arise from uncertainty regarding external factors, such as,

- Changes in water consumption
- Changes of the size of the population served
- The availability of financing
- The evolution of the legal and regulatory frameworks
- Climate changes
- The rise of energy prices
- Among others.

It is important to note that the scenarios:

- should only be designed for factors that can effectively influence decision-making within the scope of the relevant planning effort;
- should not take into account factors that can be influenced by the organization through its own intervention.

In an IAM planning process, scenarios are justifiable at any level. However, they are more frequently used for the time lines with the highest level of uncertainty, namely at the strategic and operational levels. The scenarios should be

designed in conjunction with a diagnosis effort (e.g., a SWOT analysis - strengths, weaknesses, opportunities and threats).

Evaluating information in the external context allows the identification of improvement opportunities and of the main threats that might influence the future performance of the system being operated by the utility in regards to the established strategic objectives (Figure 15)

Factors nature	Aspects to consider Changes in ...
Political and regulatory	<ul style="list-style-type: none"> - political context - legal and regulatory frameworks
Economic and demographic	<ul style="list-style-type: none"> - population size - water consumption and wastewater production - economic context - access to external funding
Social and cultural	<ul style="list-style-type: none"> - cultural aspects related to water use/reuse
Technological	<ul style="list-style-type: none"> - technological offer
Environmental	<ul style="list-style-type: none"> - natural resources availability (water and energy) - concerns with the efficient use of water and energy - concerns with waste production

Figure 15 – Factors to consider when defining scenarios

Strategic level diagnosis

The purpose of the diagnosis at a strategic level is to assess the organization's reference situation and to identify the most critical aspects to be improved taking into account the reference situation and considered scenarios.

The diagnosis entails the gathering and evaluation of information relative to the global external context that is relevant for the IAM (i.e., macroenvironment), the specific context which the utilities are a part of and the internal context of each organization (Figure 16).

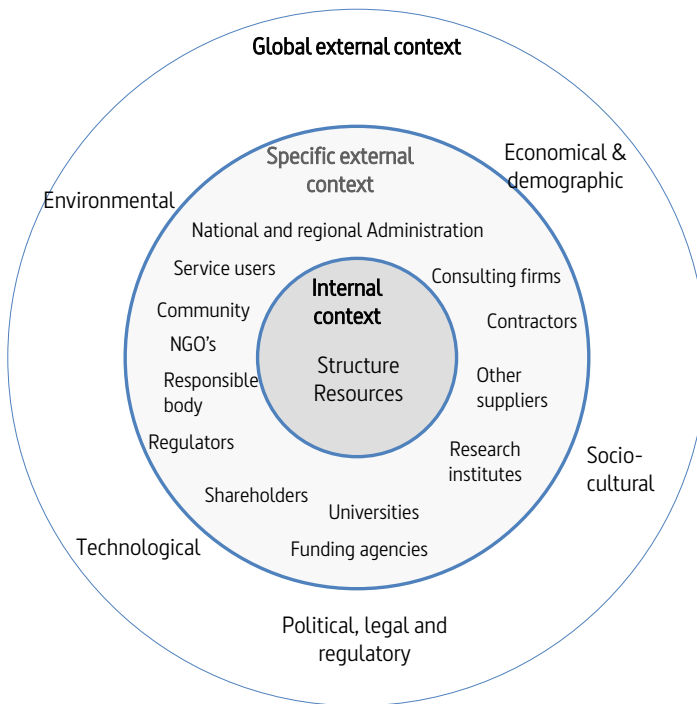


Figure 16 – Internal and external contexts

The strategic diagnosis requires the evaluation of the urban water system based on a reference situation. This situation corresponds to the evaluation starting point for performance, cost and risk. It is important to clearly establish the moment in time associated with the reference situation. The reference situation might refer to the current situation (most frequent option), to a recent past situation or to a situation in the near future (e.g., the beginning of the following financial year).

At a strategic level, the diagnosis ends with the analysis of the urban water system evaluation results. A possible methodology is a SWOT analysis (Strengths, Weakness, Opportunities and Threats), in which results are summarized by identifying the organization strengths and weaknesses, as well as improvement opportunities and main threats from an IAM perspective.

The description of internal and external contexts relevant for IAM should focus on the factors that influence the reference situation the most. The strategic plan should contain the information gathered for the analysis as well as the factor's nature, whether a strength, a weakness, an opportunity or a threat. These data can be presented as an appendix to the strategic plan.

The evaluation of the external context information allows the identification of improvement opportunities and of the main threats to the strategic objectives (Figure 17).

Improvement opportunities	<ul style="list-style-type: none"> - Improvement of the quality of service - Use of more efficient and effective technologies - Offer of new services
Main threats	<ul style="list-style-type: none"> - Changes in public policies - Negative reaction of the population towards water tariffs increase - Water demand decrease

Figure 17 – Example of opportunities and threats relevant in the IAM scope

The evaluation of internal context information allows the identification of strengths and weaknesses of the organization relative to the strategic objectives (Figure 18).

Strengths	<ul style="list-style-type: none"> - The organization has sufficient and motivated human resources with the competences required for infrastructure asset management roles and responsibilities, as well as the awareness, knowledge, understanding, skills and experience needed to fulfil them. - Complete and updated asset inventory
Weaknesses	<ul style="list-style-type: none"> - Poor condition of some assets - Lack of historical O&M records - Lack of integration of the existing information systems

Figure 18 – Example of strengths and weaknesses relevant in the IAM scope

Infrastructure asset management strategies

Based on the diagnosis, it is necessary to address the identified issues through infrastructural and non-infrastructural strategies. These strategies should be aligned with the previously outlined strategic objectives. This alignment should be clearly shown in the plan. Defining strategies is the main goal of the strategic plan.

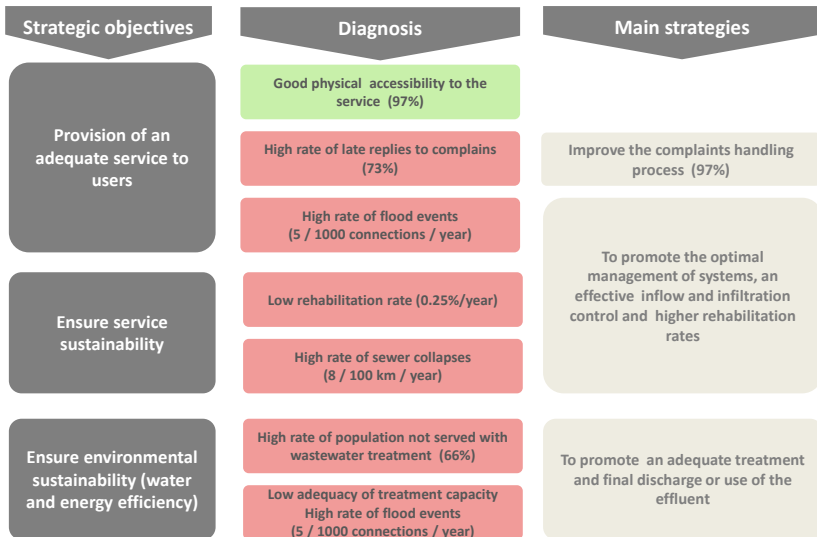


Figure 19 – Example of strategic objectives and alignment with strategies

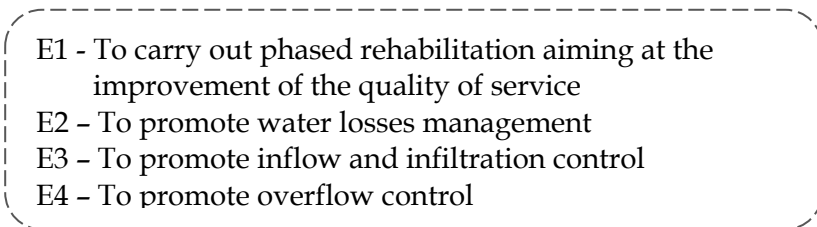


Figure 20 – Example of infrastructural strategies

- E1 - To carry out phased rehabilitation aiming at the improvement of the quality of service
- E6 - To adjust the hierarchical and the decision models and to define the outsourcing policy
- E7 - To improve the integration between the core information systems

Figure 21 – Example of non-infrastructurel strategies

Resourcing

The strategic plan should include information of human, technological and financial resources necessary for its implementation. These can be outline with varying degrees of detail, depending on the information available.

Monitoring and revision of the strategic plan

The IAM strategic plan implementation consists of the development of aligned tactical and operational plans. While the time horizon of the strategic plan is long, its implementation should be annually monitored. This allows the identification of possible gaps and improvement measures to ensure the fulfilment of the objectives and justify a possible adjustment of goals and strategies.

Monitoring consists of gathering the necessary data, systematically calculating the performance metrics for all strategic objectives and comparing these with their goals. The monitoring process should deliver an annual document synthesizing the results obtained.

The strategic plan revision consists of analysing the monitored results to identify the causes of gaps and improvement measures to bridge those gaps. This revision should happen with a frequency of less than 5 years.

The document containing the IAM strategic plan should include in an appendix a table of the changes made during the monitoring and revision processes (including the person responsible and the type of change). This record allows the proper documentation of the evolution of the strategic planning during the revision process.

References

The strategic plan should cite all technical and scientific documentation used for its development and, in particular, other plans developed by the utility that have been used.



References

4

ALEGRE, H.; COVAS, D. (2010). Gestão Patrimonial de Infra-estruturas de Abastecimento de Água. Uma Abordagem Centrada na Reabilitação, Guia Técnico nº. 16, Série Guias Técnicos, ERSAR/LNEC/IST, Lisboa, 472 pp. (ISBN: 978-989-8360-04-5).

ALEGRE, H.; BAPTISTA, J.M.; CABRERA JR, E.; CUBILLO, F.; DUARTE, P.; HIMER, W.; MERKEL, W.; PARENA, R. (2006). Performance Indicators for Water Supply Services. Second Edition. IWA Publishing. ISBN: 9781843390510.

ALMEIDA, M.C.; CARDOSO, M.A. (2010) Gestão Patrimonial de Infra-estruturas de Águas Residuais e Pluviais. Uma Abordagem Centrada na Reabilitação. Guia Técnico nº. 17, Série Guias Técnicos, ERSAR/LNEC, Lisboa, 337 pp. (ISBN: 978- 989- 8360- 05- 2).

BRATTEBØ, H.; ALEGRE, H.; CABRERA, E.; MARQUES, R., C.; HEIN, A.; CRUZ, C. O. (2013). A Master Framework for UWCS Sustainability. TRUST - Transitions to the Urban Water Services of Tomorrow (www.trust-i.net).

ERSAR e LNEC (2010). Guia de Avaliação da Qualidade dos Serviços de Águas e Resíduos Prestados aos Utilizadores. 2.^a Geração do Sistema de Avaliação. Versão 2.0, ERSAR/LNEC.

ISO 9001:2008 Quality Management Systems

ISO 24510:2007(E). Activities Relating to Drinking Water and Wastewater Services - Guidelines for the Assessment and for the Improvement of the Service to Users.

ISO 24511:2007(E) Activities Relating to Drinking Water and Wastewater Services - Guidelines for the Management of Wastewater Utilities and for the Assessment of Wastewater Services.


ISO 24512:2007(E).Activities Relating to Drinking Water and Wastewater Services - Guidelines for the Management of Drinking Water Utilities and for the Assessment of Drinking Water Services.

ISO 55000:2014 Asset management -- Overview, principles and terminology

ISO 55001:2014 Asset management -- Management systems -- Requirements

ISO 14001:2004 Environmental management systems -- Requirements with guidance for use

MATOS, R.; CARDOSO, A.; DUARTE, P.; MOLINARI, A.; SHULZ, A. (2003). Performance Indicators for Wastewater Services. IWA Publishing (ISBN: 9781900222907).



APPENDIX: Template for a Strategic IAM Plan

5

There is not a unique adequate structure for strategic plan that responds to these guidelines. For ease of application, a template for the development of IAM strategic plans is presented. The original MS Word file can be downloaded from the TRUST website as [TRUST_Strategic Plan Template](#).

Logos area

[Utility name]

Infrastructure Asset Management Strategic Plan

20[xx] – 20[xx]

Photo(s) or image(s) area

[date]

Infrastructure Asset Management Strategic Plan

20[xx] – 20[xx]

Version: 2015/[xx]/[xx]

Document reference: [File name]		Utility logo	Utility contacts
Revision #	Date	Author	Approved by:
0	20[xx]/[xx]/[xx]		
1			



The template adopted in this plan resulted from research that received funding from European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 265122.

The publication reflects only the author's views and the European Union is not liable for any use that may be made of the information contained therein.

Original template:

[TRUST/AWARE-P Strategic Plan Template](#)

CONTACT:

info@trust-i.net / media@trust-i.net

www.trust-i.net

Integrated planning

This IAM strategic plan is related with other planning instruments, as follows:

- [TEXT TEXT TEXT TEXT TEXT
- TEXT TEXT TEXT TEXT TEXT
- TEXT TEXT TEXT TEXT TEXT
- TEXT TEXT TEXT TEXT TEXT
- TEXT TEXT TEXT TEXT TEXT]

The following figure synthetises in graphical form the dependencies between this plan and other inter-related planning instruments.



List of simbols

List of acronyms

Table of contents

Strategic IAM Plan	i
1. Executive summary	1
2. Utility characterization	1
3. Plan scope and horizon	1
4. Utility vision and mission	1
5. Objectives, criteria, metrics, reference values and targets	2
5.1 Strategic objectives	2
5.2 Assessment criteria	2
5.3 Assessment metrics, reference levels and targets	3
6. Diagnosis	5
6.1 Baseline assessment	5
6.2 Improvement opportunities and main threats	5
6.3 Main strengths and weaknesses	5
7. Infrastructure asset management strategies	7
8. Resources needed for the IAM Plan implementation	8
8.1 Human resources	8
8.2 Technological resources	9
8.3 Financial resources	9
9. Monitoring and revision of the IAM Strategic Plan	10
9.1 Monitoring procedure	10

9.2	Revision procedure	10
10.	References	10
	Appendices	11
A.1	Document version control	11
A.2	Basis for the diagnosis of the current situation	11
A.3	Basis for monitoring and revision of the IAM Strategic Plan	12

Table of figures

Table of tables

1. Executive summary

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

2. Utility characterization

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

3. Plan scope and horizon

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

4. Utility vision and mission

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

5. Objectives, criteria, metrics, reference values and targets

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

Table 5.1 – Strategic objectives

Objective 1: [Designation]
Objective description: [TEXT]
Objective 2: [Designation]
Objective description: [TEXT]

5.1 Assessment criteria

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

Table 5.2 –Assessment criteria

Strategic objectives	Assessment criteria
Objective 1	Criterion 1.1 [Criterion description]
	Criterion 1.2 [Criterion description]
Objective 2	Criterion 2.1 [Criterion description]
	Criterion 2.2 [Criterion description]
	Criterion 2.3 [Criterion description]

5.2 Assessment metrics, reference values and targets

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

Table 5.3 – Assessment metrics

Objectives	Assessment criteria	Metrics	Reference values			Targets		
			Poor	Fair	Good	t0	t...	tN
Objective 1	Criterion 1.1	metric (units) metric (units) metric (units)	Range Range Range	Range Range Range	Range Range Range	value value value	value value value	value value value
	Criterion 1.2	metric (units) metric (units) metric (units)	Range Range Range	Range Range Range	Range Range Range	value value value	value value value	value value value
...

6. Diagnosis

6.1 Baseline assessment

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
 TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
 TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
 TEXT TEXT TEXT TEXT]

Table 6.4 – Baseline assessment

Metrics	Reference values	Results (t0)	Comment
metric (units)	Poor: range Fair: range Good: range	value	TEXT
metric (units)	Poor: range Fair: range Good: range	value	TEXT

6.2 Improvement opportunities and main threats

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

6.3 Main strengths and weaknesses

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

7. Infrastructure asset management strategies

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

Table 7.5 – Infrastructural strategies

[Strategy designation]
Strategy description: [TEXT]
[Strategy designation]
Strategy description: [TEXT]

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

Table 7.6 – Non-infrastructurel strategies

Strategy 1: [Strategy designation]
Strategy description: [TEXT]
Strategy 2: [Strategy designation]
Strategy description: [TEXT]

8. Resources needed for the IAM Plan implementation

8.1 Human resources

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

Table 8.7 – Human resources needed for the IAM Plan implementation

Resources	[t1]	[t2]	...	[tN]
TEXT				
TEXT				

8.2 Technological resources

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

Table 8.8 – Technological resources needed for the IAM Plan implementation

Resources	[t1]	[t2]	...	[tN]
TEXT				
TEXT				

8.3 Financial resources

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

Table 8.9 – Financial resources needed for the IAM Plan implementation

Resources	[t1]	[t2]	...	[tN]
[RESOURCE 1 DESCRIPTION				
RESOURCE 2 DESCRIPTION				
RESOURCE ... DESCRIPTION]				

9. Monitoring and revision of the IAM Strategic Plan

9.1 Monitoring procedure

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

9.2 Revision procedure

[TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT TEXT
TEXT TEXT TEXT TEXT]

10. References

Appendices

A.1 Document version control

Table A.10.1 – Document control

Version #	Date	Main changes	Person in charge
1			
2			

A.2 Basis for the diagnosis of the current situation

Table A.2.1 – External global context

Table A.2.2 – External specific context

Table A.2.3 – Internal context

A.3 Basis for monitoring and revision of the IAM Strategic Plan

Table A.3.1 – Assessment of the current performance

Metrics	Targets (t)	Results (t)	Comment
metric (units)	value	value	TEXT
metric (units)	value	value	TEXT

Table A.3.2 – Strategic Plan revisions

Revision #	Date	Main changes	Person in charge	Approved by:
0				
1				
...				

D53.1b / MANUAL 3
Strategic planning of urban water services at utility level

4-4-2

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 265122.

This publication reflects only the author's views and the European Union is not liable for any use that may be made of the information contained therein.

