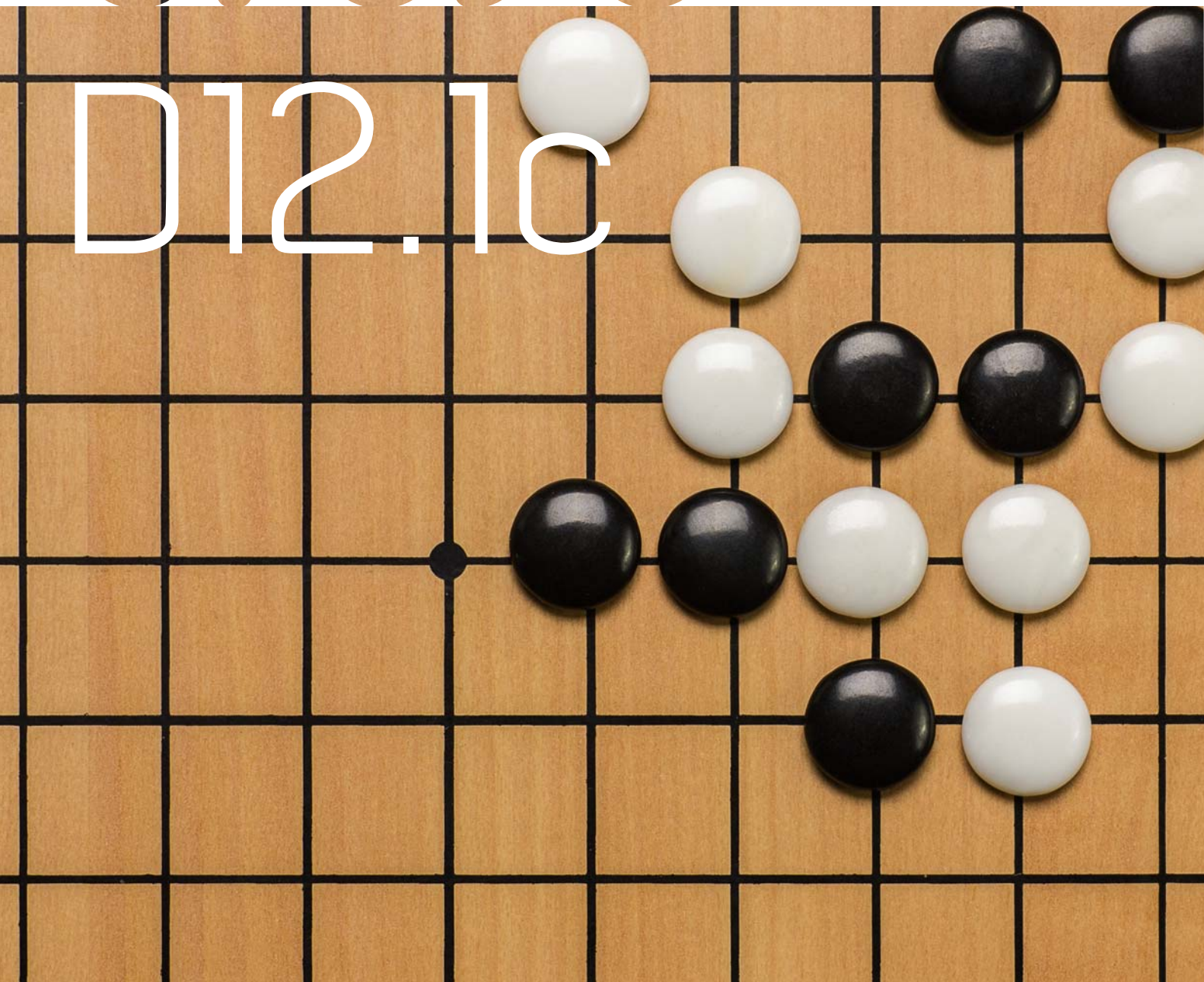


# Guidelines for Urban Water Strategic Planning: Inspiration from theories & best practices

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# D12.10



## Guidelines for Urban Water Strategic Planning: Inspiration from theories & best practices - D12.1c

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Final Version for Distribution

April 2015

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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 authors' views and the European Union is not liable for any use that may be made of the information contained therein

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## 1. INTRODUCTION

The TRUST project aims to create co-produced knowledge that urban water utilities can use for planning transitions. Such transitions can be planned in various ways based on different premises about what constitutes desirable or necessary change, the degree to which such change can be planned, and what a proper planning process entails.

This Report 12.1c aimed at reviewing the composition and content of existing strategic plans that have been developed by leading water utilities and examining the processes by which these plans were designed. This review keeps the diversity of water utilities in view by sampling plans from water scarce areas, urban – peri-urban areas, and green areas. The following plans were studied:

- Auckland / Watercare (New Zealand)
- Adelaide / SA Water (Australia)
- Köln (Germany)
- East Bay (USA)
- Amsterdam / Waternet (Netherlands)
- Fergus – Elora (Canada)
- London / Thames Water (UK)
- Madrid (Spain)
- Maputo Metropolitan Area (Mozambique)
- Rural Water and Sanitation – Mozambique (Mozambique)
- PEAASAR II – Portugal (Portugal)
- Sao Paulo (Brazil)

Previous reports 12.1a (Ramôa et al., 2012) and 12.1b (Smith et al., 2012) resulted in reference points for this report by identifying the most important contextual changes and characterising the capacities that enable water utilities to adapt to these changes.

This report begins with a review of best practices from a theoretical perspective (Chapter 2), structured around the basic steps in an adaptive strategic planning process (depicted in Figure 1). We discuss different ideals concerning how to deal with the future and describe the principles of strategic planning on a conceptual level. In the final chapter we review actual practices based on an analysis of 12 strategic plans developed by leading water utilities, revealing similarities & differences. These result in guidelines for the strategic planning principals, practices, and products that can be seen as best practices for European water utilities. The main guidelines, which are developed and explained in Chapter 3, are listed below:

- Pay attention to defining the focus of the strategic plan by delineating the sphere of control and influence of your utility.
- As the first step in the planning process, consider which parties (e.g. multi-discipline, multi-sector, multi-level actors) need to be involved in the different steps (e.g. the selection and design of a strategy, or just definition of the vision).
- Manage the expectations of stakeholders by communicating what status their input has in the planning process.
- A permanent structure for stakeholder involvement can be useful for developing a productive working relationship, formalizing roles, and generating a shared feeling of responsibility.
- Consider the different motives for making a strategic plan and which ones need to be communicated with a wider audience.
- As a point of reference, define the current state of the internal system including, besides physical assets and resources, social conditions.
- As regards forming a vision iteratively, will is prior to necessity and capacity. Define a clear vision for the internal system and the transactional environment.
- Distinguish between short- medium- and long-term objectives to translate abstract future ambitions into practical actions.
- Consider a broad palette of trends and the interdependencies between them.
- Select a method of futures research that matches the time horizon of your plan.
- Resilience can be achieved from a perspective of robustness and/or flexibility. It is useful to consider which approach(es) match the local circumstances.
- There are various methods for defining the strategic options and selecting a strategy. The appropriate method depends on the level of stakeholder development, the variance between options, and the complexity of the system. Be aware that the methods used influence the outcomes and make an informed choice.
- An adaptive planning process assumes that the plan will be continuously optimised based on progressive insight. Learning through evaluation is thus essential.

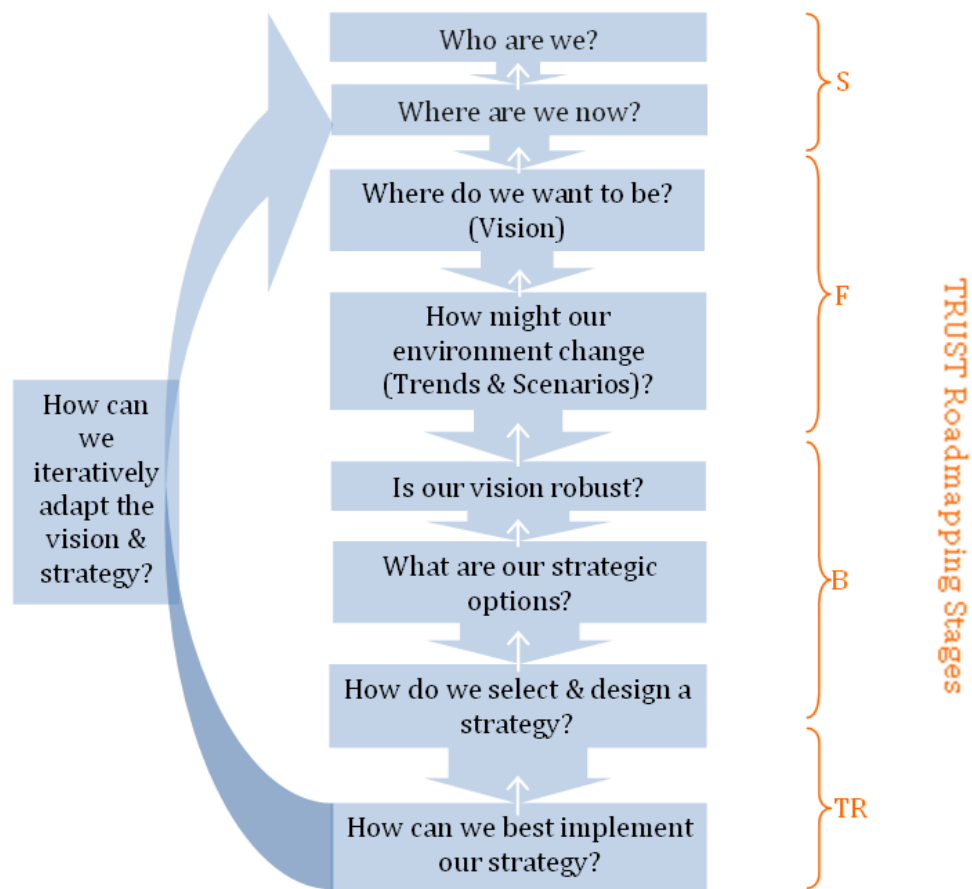


Figure 1: Basic steps in an adaptive strategic planning process

Countless tools and methods have been developed for strategic planning. Some of the most prominent methods focus on a particular part of the strategic planning process. Take SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) for example: this method is commonly used for identifying the internal and external factors that may be favourable or unfavourable to achieving a certain vision. But it does not deal with the preceding step of defining the vision itself, or the subsequent step of designing a strategy. It is thus only one element of a comprehensive planning process.

Strategic planning in the 1950's and 1960's tended to work with blueprint concepts from a rational technical view, however during the 1970's and 1980's there was increasing criticism of this approach and the unintended negative consequences became apparent (Rittel, 1973; Mintzberg, 1994). Despite the mounting criticism in planning literature, most existing Urban water systems were also typically designed using a linear approach with high predictability and controllability in mind and a focus on technical problems only. Pahl-Wostl (2007) describes this as “the command-and-control paradigm that has been dominating the water management community for decades.”

Since the 1990s there has been increasing recognition within the water sector, however, that planning for urban water systems involves high levels of uncertainty and complexity, as well as diverse views and interests. In response, planning processes are becoming more integrated, adaptive and participatory. Such approaches assume that resilience is best achieved through flexibility, and emphasize the need for learning by using an iterative, adaptive planning process. This ideal-typical strategic planning process, depicted in Figure 1, forms the framework around which the chapters in this report are organized. The blue arrows show the general direction of the process and the white arrows indicate that each step is iterative.

It is important to recognise that the questions asked in Figure 1 can be answered to varying degrees from different perspectives using diverse methods and tools: the figure does not depict a method itself but a process of thinking. In addition, the questions themselves do not necessarily follow in the sequential order shown in Figure 1. Furthermore, “an organisation can plan (consider its future) without engaging in planning (formal procedure) even if it produces plans (explicit intentions); alternately, an organisation can engage in planning (formal procedure) yet not plan (consider its future); and planners may do all or some of these things” (Mintzberg, 1994).

TRUST Deliverable 13.2 (Hein et al., 2012): *‘Template on roadmap structure and process, protocols and guidelines’*, provides a manual of how the ideal typical strategic planning process presented in the current Report 12.1c can be employed in practice. The roadmap process manual from Deliverable 13.2 includes four main stages: Scoping (S), Forecasting (F), Backcasting (B) and Transfer (TR). These stages are included in Figure 1 to illustrate how the roadmapping stages relate to the general phases of an adaptive strategic planning process.



## 2. THEORIES

### 2.1. Dealing with the future

Strategic planning is inherently linked with time. Time is conceptualized in different ways by people from different cultures and different professional roles. People from the countries represented in the TRUST project are likely to share several general concepts, such as the time zones (past, present, and future), but ideas about more specific features of time may differ considerably. One aspect that is particularly important for the TRUST project is the level of determinism that is assumed, the degree to which we consider the future to be predictable, and the extent to which we believe that these predictions can be verified as true prior to them occurring.

The TRUST project aims to generate knowledge that urban water utilities can use to plan and justify transitions. But what sort of knowledge are we aiming to produce? Someone who believes in historical determinism may wish to extrapolate trends from the past to make probabilistic predictions based on quantitative certainties and knowledge of initial conditions. But practice has proven that resting on this approach alone is a common pitfall for planners (Van Asselt, 2010). Theorists also acknowledge that “interconnectedness, interdependence and seemingly acausal connections place this eminent and hugely successful system under pressure” (Adam, 2004).

Most urban water cycle systems were originally designed by engineers with high predictability and controllability in mind. But this “command-and-control” approach is progressively considered unsuitable because of changes in how water management problems are perceived (Pahl-Wostl, 2007). Water management has undergone a fundamental shift to involve what are called ‘wicked’ planning problems (Lach et al, 2005). Wicked problems are characterized by complexity, uncertainty, and diverse interests and views. The water sector is responding by adopting a more integrated, adaptive and participatory management style (Segrave et al., 2011).

Adaptive management is meant to deal with uncertainty by investing in flexibility and learning so that adjustments can be made iteratively as new insights emerge. As illustrated in Figure 1, results from each stage in the planning process are periodically adjusted and readjusted. New insights may surface naturally through experience, though an official process of evaluation is also generally recommended. Besides formalizing any changes that have been signalled, official appraisals may be used to create a mandate for making adjustments to previously adopted plans.

Recognition of the complex interactions between physical water systems and various other physical and social systems prompted calls for integrated management of aspects that were previously treated discretely. The principles of Integrated Water Resources Management (IWRM) or Integrated Watershed Management (IWM) have become increasingly popular in the water sector over the past three decades. What remains

problematic is the actual implementation of the theories (Allan, 2003, Biswas, 2004, Mollinga, 2008). One generally accepted postulation is the need for systems thinking.

Systems Thinking is a way of analyzing the world that rejects both reductionism and ideas that assume linear cause and effect relationships. A systems thinking approach recognises the fact that complex systems involve emergence (the whole is more than the sum of its parts) and cyclical feedback with unpredictable tipping points and dynamic thresholds. Systems Thinking thus allows for a degree of indeterminacy, randomness, and inherent uncertainty; making it a useful approach towards understanding complex systems, but not towards modelling them. Systems analysis involves exploring the interactions between different aspects of the whole system and the wider environment. For this reason, the first step in any systems thinking approach generally involves defining the boundaries. We discuss the definition of the internal system, external system, and transactional environment in the next section on 'identity'.

Besides the complexity of the physical systems, another main challenge associated with new planning approaches is to have proper stakeholder participation in actual decision-making processes. This is also important to be able to represent the interactions between physical, engineered systems and human systems. The dominant management model in the water sector is still relatively monocentric, focussing on the physical systems, whereby a limited number of organisations oversee operations and planning in a centralised way. In the worst case, participation may become an end in itself rather than a means of benefitting from the diversity of views available. For the TRUST project, we promote approaches to engaging stakeholders that go beyond participation and involve active learning and reflexive decision making (Wester, 2010). This ambition introduces). When diverse researchers, policy makers, private parties, and public organisations and interest groups are concerned about the future of an urban water supply system it may be unclear what the problem or solutions are. Under such circumstances it is important to recognize the diversity of views and values associated with water management and avoid the pitfall of artificially issues associated with ambiguity.

Ambiguity “emerges from the simultaneous presence of multiple valid and, sometimes conflicting ways, of framing a problem” (Brugnach, 2012: 78 reducing the ambiguity that exists by focusing on technical solutions and the related types of knowledge. Social learning theory indicate that it is important to separate processes aimed at achieving consensus from those intended for developing understanding and strategic insight. And despite the difficulties that ambiguity brings, it is also a source of diversity for reframing issues as a step towards more transparent and easily implemented responses (Van Looy et al., 2002).

A strategic planning process may be instigated for various reasons. The most obvious motive might be the ambition to translate abstract ideas or goals into practical plans. Once a clear vision has been defined then the process of backcasting from this vision to define and sequence intermediate goals and plan practical tactics can be relatively logical. Many strategic planning processes are, however, initiated by leaders who have a

particular political agenda for which they are want to generate a mandate. Likewise, bottom-up community initiatives may benefit from participative strategic planning by actively involving various stakeholders and creating support for a certain vision. In any case, dealing with the future involves certain moral and ethical considerations related to guardianship. The planners, at least, should be conscious of the motives for planning.

Societies that are dedicated to progress and innovation have developed a historically unequalled capacity to cause increasingly distant future consequences. For example, the half-life of some radioactive waste is longer than one million years. On the other hand, the time horizons for what are considered 'predictable events' are becoming ever shorter (Adam, 200). Since responsibility is traditionally identified with actions for which the outcomes can be known, uncertainty and ignorance are commonly used as excuses for unintended outcomes. Since our ability to produce futures has grown, it is necessary to find new ways of connecting our actions to ethics. Countless attempts have been made at operationalising concepts such as intergenerational equity, to little avail. The precautionary principal is perhaps the most prominent example. In contexts where the future is treated as having an open potential, the arbitrary cut-off points that are proposed as horizons of socio-political concern can be debated and shifted indefinitely. It is recommended that planners take the time to immerse themselves in the ethics of dealing with the future.

## 2.2. Strategic Planning

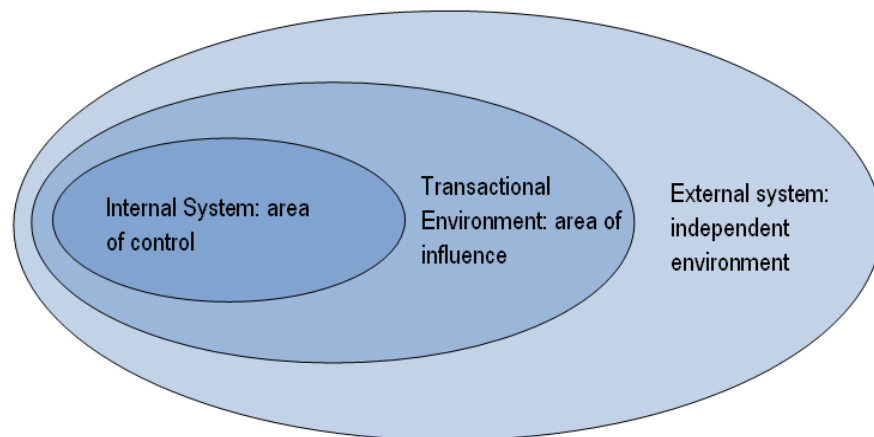
The adaptive strategic planning process, which was introduced in Chapter 1 and depicted in Figure 1, forms a framework around which the following section is organized. Each step is iterative but the general planning process is sequenced to answer the questions in the order that they are described below.

### 2.2.1. Who are we?

The first question is one of identity. In the case of urban water utilities, we refer to organizational identity, which is "a cognitive linking between the definition of the organization and the definition of self" (Dutton,1994). Social identity theory and self-categorization theory provide a general theoretical basis for analyzing organizational identities. Basically, people define themselves by acting in social groups that are important to them. Social psychologists have argued that people assume various identities according to the role they are performing (Goffman, 1959; Ting-Toomey, 1993). An individual may alternate between being parent, friend, sportsman, and water manager - all in one day. By a process of 'identity negotiation' individuals establish mutual expectations of one another to form groups (Swann, 2009). Since a strategic plan concerns the future of an organization that comprises various individuals who fulfill diverse roles, divergent images of the organization may exist. An analysis of the current organizational identity can provide key strategic insights and a point of reference against which future changes can be assessed. One useful method is to examine how individuals within an organization characterize the organization and to

compare these views with each other and also with how external parties view the organization.

A second aspect of identity, which is an important starting point for any system analysis, is to define “the sphere of influence”. This concept is often used to delineate the boundary between the internal (focus) and the external system. The internal system is thus defined as the spatial and conceptual realm over which the organization has significant cultural, economic, political, or physical control. On the other hand, the external system is the rest of the world, over which the organization has no influence. There is a grey area on this boundary, which is referred to as the transactional environment. The organization does not have direct control over the transactional environment but may, for example through lobbying, influence other organisations or individuals to change circumstances in a certain way (Figure 2). Both the transactional environment and the internal system are embedded in the external system.



*Figure 2. Defining system boundaries (Gharajedaghi, 1999)*

Detailed definition of these boundary conditions can be quite time consuming and may be perceived as unnecessary. However, strategic plans that rest on unclear system boundaries run the risk of becoming trapped in cyclic logic or failing to plan for aspects of the system that they do have control or influence over. For urban water utilities the boundaries of the internal system depend on the aspects of the UWCS over which the organization has direct control. The Transactional Environment is likely to include the entire UWCS and may extend into, for example, the agricultural or industrial sectors. The external system, on the other hand, is the context in which the UWCS is located. This external system is typically characterized by social, economic, political, technological, ecological, and demographic dimensions over which the water utilities have no influence.

In the TRUST project we have generally defined the transactional environment for urban water utilities as the Urban Water Cycle System. It is interesting to discuss how this system is typically bounded in practice, looking at existing strategic plans, because this reveals how the water utilities perceive their sphere of influence and responsibility. From a theoretical perspective, these boundaries are arbitrary and so there is little value in attempting to define a generically applicable delineation of the sphere of influence of an urban water utility. Theories and practical experience does, however, substantiate the need to explicitly define stakeholders and the roles of different actors at the outset of a strategic planning process. These stakeholders need to be actively involved from the beginning of the project: they are part of the answer to the question “who are we?” There are various methods of Stakeholder Mapping (Hemmati et al., 2002), that are also useful in the next step: defining the current state of the internal system.

### **2.2.2. Where are we now?**

The current state of the internal system characterised through the previous step is evaluated to create a reference point against which future changes can be assessed. From the perspective of the present, this step can be useful for indicating the need for change and creating a sense of urgency. In hindsight, it is useful to have a baseline to justify investments and resources used in planning and for evaluation of progress towards the vision. The process of defining the current state from the perspective of different stakeholders also reveals the level of ambiguity present in the perceptions of the various actors in the transactional environment. Descriptions of the current state can vary in the degree of quantitative and qualitative information that is used to characterize the system. The level of detail also depends on the extent of the internal system and the transactional environment as defined in the previous step. Since planning in the field of water management is increasingly recognized as a wicked problem, it is generally sensible to define social conditions, such as community expectations towards the water utility and the governance structure of the sector, as well as the state of the physical assets and resources, such as the percentage leakage in the distribution network and the storage capacity of reservoirs.

From a theoretical perspective it is useful to invest time and resources into characterizing the current state from different perspectives using, for example, interviews with a sample population of the relevant actors. Characterizing the relationships between actors, along with their ideas and goals, and the rules and roles that govern their interaction, provides a firm basis for the next steps and can broaden support for the planning process. On the other hand, experience has taught us that planners generally invest little time in this step (Mollinga, 2008). There are also few accepted or standard methods available for this phase in the strategic planning process. One secondary outcome of this step is that the definition of “who are we?” may be broadened or narrowed following new insights. It is important to continue learning throughout the adaptive planning process through such iterations.

A concept that is increasingly popular both in the theory and practice of planning for sustainability, is the Ecological Footprint (Wackernagel and Rees, 1996). The Footprint is a quantitative measure of the demand of an anthropogenic system on the ecological system that supports it, which can be compared with the 'natural capital' that the ecosystem supplies. The methods used to calculate Footprints vary widely between countries and between people with different political or theoretical viewpoints.

It is important to recognize that most methods used for calculating Footprints fail to account for the complexity of the interactions between the anthropogenic and ecological systems. For example, chemically supported monocultures with high yields generally score better on Footprint tests than organically grown crops that are produced using agroforestry with high biodiversity. The Footprint also omits aspects of human rights and social justice such as poverty and education. More importantly, this approach is associated with the 'green economy' paradigm, which assumes that accounting for 'natural capital' and 'ecological services' through direct valuation is a meaningful and good way of moving towards a sustainable society.

A recent development is the concept of an Ecological Handprint (Rohwedder, forthcoming), which expands on the Footprint by integrating aspects related to human well-being with those related to nature's well-being. A more fundamental development is that this approach helps organisations to work towards normative goals, as opposed to perceived necessities. Handprints quantify what the organization is doing, in positive terms, towards reducing consumption of energy and resources, and improving social and environmental conditions. Since social conditions and the ecosystems that support them are fundamentally interrelated, the Handprint method proposes an integrated approach to designing transitions. Using this method, normative principles can be used to define a desired future state of a system that may include the outer reaches of the transactional environment. These principles can then be used to guide decisions in the present.

### **2.2.3. Where do we want to be?**

Perhaps the most critical and complicated stage in the strategic planning process is the definition of a clear vision. The various stakeholders in any given UWCS generally have diverse interests, perceptions, and understandings of the issues at hand. Defining a shared vision is a normative process for which social learning is required, to develop understanding of the various viewpoints, followed by a process of decision making and/or achieving consensus (Wals, 2007).

The first version or iteration of the vision, before it is tested against context scenarios and adapted, should focus on that which is desired and not on what is perceived as necessary or possible: Will is prior to necessity and capacity (Adam, 2007). The motives for decisions regarding the desired future state do not depend on certainty but on hopes, values, responsibilities, interests and ethics. Stakeholders in an urban water cycle may, for example, consider having a 'carbon neutral water supply system' or 'zero leakage losses in the distribution network' or 'water treatment without chlorine' or 'a 'bottom-up

governance system' by 2020 as 'desired future states'. As with the moon landing, none of these visions is per se necessary. Leadership and morality cannot be substituted by certainty and foreseen necessity. The burden of wicked planning problems, which are complex, uncertain, and ambiguous, can result in managers and policy makers transferring the responsibility for decisions to scientists in the search for certainty. But accepting this task would be foolish since science cannot determine what is right or wrong or generate knowledge about the unknowable.

A vision represents the desired state of the internal system and, to some extent, the transactional environment. It can also include the solution of existing or anticipated problems and maintenance of a desired existing state. A vision may be defined qualitatively and/or quantitatively: what is important is that it is a source of motivation for those involved. A vision is also associated with a given time horizon, for example 2030 or 2050. Selection of a suitable time horizon is critical, since it should extend over the investment period of typical water supply and sanitation infrastructure and allow for relatively slow processes such as climate change and demographic developments. On the other hand, the time horizon also needs to be translated back to a human scale of years rather than decades. People tend to discount temporally distant events, so the vision may otherwise be ignored in everyday decisions and actions. One of the main uses of a vision is to be a source of inspiration. Sometimes visions are confused with mission statements, which describe why the vision is important and how the organization engages in its realization. Visions can also become convoluted if they include strategies, which describe shorter term milestones or goals and the roadmaps or paths that have been chosen towards reaching the vision. A clear vision does not include these secondary dimensions, which are developed in the next step.

#### **2.2.4. How might our environment change?**

Once the present and future states of the internal system have been defined, the following phase involves analyzing how the external system may change. Since the external system, by definition, includes the entire world outside the transactional environment, the first step is to limit this system to the relevant context. There exist various methods for investigating potential future contexts, including desk research, interviews, brainstorming, Delphi analysis, trend analysis, and scenario planning. Choosing an appropriate method depends on the goals of the investigation regarding both the level of detail that is asked for and the degree of quantitative and/or qualitative information that is seen to be required to justify decisions. A related concern involves fundamental assumptions about whether the changes that are envisaged need to be defensible in terms of historical determinism or whether discontinuity and emergence is assumed; making all imaginable changes possible. And if emergence is acknowledged then even unimaginable changes are accepted as credible.

In the context of the TRUST project, one of the main reasons for investigating how the context of an organization might change is to facilitate assessment of the suitability or robustness of the internal vision under different future circumstances. For this reason, it

is important to include a wide range of factors that might impact on the organization and the transactional environment. Perhaps the most widely accepted means of performing a broad analysis is the DESTEP method, which involves preparing an inventory of Demographic, Economic, Social, Technological, Ecological and Political factors. Dividing the external system into these dimensions ensures that diverse aspects are accounted for. This approach may also reveal a bias towards certain dimensions over others and expose potential blind spots and unknown unknowns (as opposed to known unknowns).

The division of the external environment into DESTEP dimensions can also make the selection of a suitable spatial and temporal scope less complicated. Distinguishing between dimensions allows the planner to work with differentiated time horizons and geographic ranges that match the rate of change for each dimension and the adaptive capacity of the water utility. Ecological and demographic changes may be slower than technological and political processes. Similarly, global ecological trends (e.g. climate change) may have significant local impacts on urban water utilities, whilst local demographic trends may be much more relevant for these organizations than global scale demographics.

Once a long-list of contextual factors and trends has been identified, various methods can be used to progress to the next step. Some strategic plans conclude the analysis phase here, and simply describe the various factors and trends individually; highlighting the main assumptions and uncertainties as a basis for designing, rationalizing, and justifying a strategy towards the vision. This approach is generally chosen because it is less time consuming than alternative systematic approaches, and the planners can use intuition and experience to make assumptions. The risk of using this approach is that planners confirm their own biases and are lulled into a false sense of security by assuming higher than actual levels of certainty and only accounting for what is perceived to be the most likely scenario.

The most prominent systematic method for exploring the uncertainty of the future, rather than trying to forecast it, is Scenario Planning (Mintzberg, 1994). This approach is often used in complex circumstances where the planners have to deal with longer time horizons and greater uncertainties. For these reasons, it is likely to be the most fitting approach for the wicked strategic planning problems that urban water utilities face when making long term plans. Basically, scenario planning accounts for discontinuity, emergence, and uncertainty by working with various scenarios that are fundamentally different from each other. Even so, it would be a mistake to assume that scenarios can represent the full extent of the uncertainty that is inherent to the future.

### *Scenario planning*

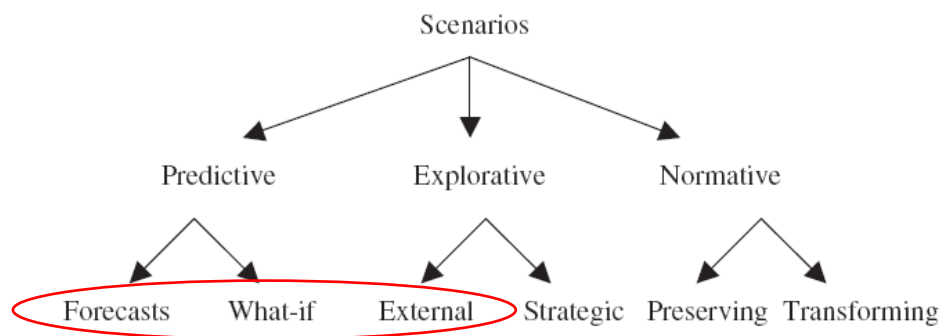
Scenario planning is a broad approach that can be used for quite different purposes. Various typologies have been developed to categorize scenarios. The categories developed by Börjeson (2006) may be most useful to those involved in the TRUST



project because they are based on the different types of insight that the planner is aiming to develop on an operational level, and can thus work as a guide for UWCS planners wishing to use scenarios. Three main categories of scenario are distinguished in this classification system based on the questions the planner may wish to explore:

1. Predictive: What will happen?
2. Explorative: What can happen?
3. Normative: How can a specific target be reached?

Since we are discussing the use of scenario planning as a method for answering the question of how our environment might change, Categories 1 and 2 are of interest. The focus is on scenarios about the external system, which are usually called Context Scenarios. System Scenarios include aspects of the internal, transactional, and external environment, and Goal Scenarios focus on a normative vision for the internal system. The Explorative category 2 defined by Börjeson (2006) includes both Context Scenarios, which are referred to as External, and System Scenarios, which are called Strategic. The Predictive category 1 includes Forecasts and What-if scenarios, which different types of Context Scenario. Considering our focus on changes in the external system (Context Scenarios) at this point in the adaptive strategic planning process, it is interesting to discuss three of the types defined by Börjeson (2006): External, Forecast and What-if scenarios (Figure 3).



*Figure 3 Scenario typology with three categories and six types (Börjeson, 2006)*

External, Forecasts and What-if scenarios are different types of Context Scenarios. Context scenarios are stories about how the present environment might change and how the future environment may become. These stories can be developed assuming historical determinism or discontinuity. This assumption depends to some degree on the epistemological stance taken by the planners regarding what can be known about the future (e.g. positivism, critical realism, constructivism). If these fundamental assumptions are unclear or not considered explicitly by the planners then some perspectives may be

neglected and the objectives of the planners may be sought using inappropriate methods (van Asselt, 2010).

Scenarios that assume discontinuity are often called “what-if” scenarios, and they are used to test a vision against surprise events that could occur at any time in the future, are entirely unpredictable, and have no direct causal relationship with the past. A “What-if” scenario can be useful for testing the robustness of a vision and strategy and for designing response strategies for such shock events. Concepts such as likelihood and probability do not play a significant role in the definition of “what-if” scenarios. Use of “what-if” scenarios can be justified by referring to emergence in complex systems, tipping points, and uncertainty. They can include both qualitative and quantitative information, but are generally more qualitative.

Forecasts – scenarios that are developed assuming a high degree of historical determinism – begin with analysis of past trends, using the DESTEP method for example. A long-list of trends is made to characterize the external system. The most important trends are then selected, generally based on the potential impact on the organization and the uncertainty. To make forecasts (extrapolating past trends into the future) a high level of certainty is required. Forecasts are generally based on computer models and are generally more quantitative than qualitative and based on statistical probabilities. For this reason they are most suited to the short term to limit uncertainties. Economic forecasts are a well-known source of information that is often used to justify plans and decisions. For the TRUST project, it is likely that urban water utilities may wish to test their plans against climate scenarios.

It is important to remember that climate change is just one dimension of the future state of any external system. Other social, economic, political, technological, ecological, and demographic aspects of any particular future state of the external system will also determine the impact that climate change has on a given water supply and sanitation system. False dilemmas also appear when we concentrate on the short-term goals of a specific sector. This type of thinking often results in two-dimensional trade-offs, like financial gain versus biodiversity, which reflect the assumptions behind oversimplified models rather than the real complexity of the interrelated systems. For this reason it is preferable to use internally consistent Explorative Scenarios such as the Global Environment Outlook (GEO) scenarios, produced by the United Nations Environment Programme.

Being explorative, External Scenarios are generally developed as a set of several scenarios that reflect a wide range of possible situations. This allows the planner to investigate the implications of a wide range of possibilities. External Scenarios assume some degree of historical determinism, and therefore generally begin with analysis of past trends. But uncertainty and complexity are assumed to be so significant that forecasting future states of the external system is considered impossible. For this reason, External Scenarios tend to involve a longer time horizon and allow for more fundamental, structural changes such as those related to demographics or

environmental change. When developing External Scenarios, the trends with the greatest uncertainty and potential impact are generally used to define the fundamental differences between scenarios in the set, and then other trends and factors are integrated into the different storylines to form internally consistent scenarios. Ideally, this process is undertaken using a participative process so that the various actors in the internal system understand and accept ownership of the scenarios. The information used to characterize the scenarios may be both qualitative and quantitative.

External Scenarios focus only on factors that are beyond the control of the planners. This makes them useful for testing the robustness or resilience of strategies and visions – checking that they will work under various future states of the external system. Furthermore, External Scenarios better reflect the complexity and uncertainty that is present in the context of urban water utilities, and if participative processes are used during the scenario development process then the ambiguity inherent in the various viewpoints of actors in the internal system can also be accounted for. For these reasons, External Scenarios may provide more strategic insights than Forecasts and What-if scenarios, though they can also be very time consuming. On the other hand, adopting and adapting existing scenarios can save a lot of time and work. For example, External Scenarios developed by a national government may be very useful to an urban water utility. The various actors who would otherwise be involved in the participative process of developing the scenarios will need to become accustomed to and accept adopted scenarios, which is a downside of taking this shortcut.

Adaptation of existing scenarios may be a practical way of involving External Scenarios in the strategic planning process. The SCENES project, which was a four year Integrated Project under the EU 6th framework directive, has already enriched these GEO scenarios to be specifically relevant for the European water sector. The EU 7th framework PREPARED project also works with scenarios that may be useful to partners in the TRUST project.

### **2.2.5. Is our vision robust?**

It is in this stage that the vision for the internal system is confronted with (1) the current state of the internal system, and (2) the various probable and possible future states of the external system. As described in the previous section, context scenarios are most useful for testing the robustness of a vision because they represent a range of possible future states that vary according to diverse Demographic, Economic, Social, Technological, Ecological and Political factors. It is also possible to test the robustness of a vision against Forecasts and What-if scenarios. What-if scenarios may be useful for testing known weaknesses of the internal system against extreme conditions in the external system. And Forecasts can be useful, generally in the shorter term, for trends with relatively certain probability distributions (e.g. demographics).

The process of testing a vision against context scenarios should be iterative. By allowing the vision to be redesigned in several iterations decision makers are given the

opportunity to learn. And it is through learning that societies and sectors become adaptive. One useful means of categorizing information about the internal and external systems and presenting decision makers with alternatives, rather than a predetermined solution, is the Driver-Pressure-State-Impact-Response framework. To understand the relationships between these categories, scientific models are generally developed. Research projects often focus on improving the quality of these models and increasing certainty about outcomes. One risk associated with this focus is that the spectrum of scenarios is reduced to that which can be justified by the models based on past data. Similarly, decision makers can be lulled into a false sense of security if they assume that the model outcomes represent all possible future states. And if decision makers misuse model outcomes to defend decisions, rather than employing the model to better understand the relationships between the systems, then the learning aspect of the process is neglected and claims of resilience are for the most part symbolic.

The resilience of anthropogenic systems may be increased by investing in time, flexibility, robustness, and/or knowledge (Meijer, 2007). When an adaptive approach is feasible, strategies are likely to focus on improving flexibility and knowledge. Robustness generally involves engineering redundancies into a system, for example pumps in parallel, which tends to be more costly. But if frequent adaptation is costly, as with investments in urban water supply and sanitation infrastructure, robust solutions are needed. A robust solution implies that it is likely to remain effective within a wide range of context scenarios. In the iterative process of testing the resilience of a vision against context scenarios opportunities and threats become apparent. These may subsequently be represented using indicators for which early warning systems can be designed. Decision makers can then choose to invest in robustness and/or flexibility in their strategy for anticipating impending problems and exploiting emerging opportunities effectively. Through several iterations with the relevant decision makers and stakeholders a desirable strategy emerges. What is desirable depends on the interests, values, and norms of the stakeholders.

Collective futures research, involving stakeholders, researchers and practitioners in trans-sectoral cooperation and using methods such as participatory scenario planning and backcasting, is one way of employing the diversity of perspectives and the openness of the future beneficially. These methods also represent investments in knowledge and strategic intelligence, which may translate into an increase in the time available for adaptation.

### **2.2.6. What are the issues and our strategic options?**

A strategy is a series of actions for attaining specific goals or objectives (vision) that have been thought out, defined, and recorded in advance. This series of actions represents the proposed pathway between the current state and the desired future state of the UWCS (internal system). There exist various methods for identifying opportunities, threats, issues, and strategic options. When a vision is confronted with a set of different external scenarios then the main opportunities and threats become apparent by asking the

question: “what would happen if our organization was and acted like this under those external circumstances?”. One method that can be used to structure this step is Relevance-tree analysis, which graphically represents the possible first, second, and third order positive and negative consequences of certain actions, and shows how these consequences influence each other. If a participative approach is used then Social Learning can be a very enlightening process whereby scientifically informed insights are intersubjectively reviewed with the various stakeholders in the UWCS to highlight opportunities and threats for the different parties.

Another approach, which also allows for inclusion of the various perspectives of different actors in the UWCS, is Multi-criteria Analysis. This method defines a decision making environment using criteria that have been defined by the various actors in the system. This is a classic way of structuring complex problems. Multiple criteria decision making processes vary vastly in the degree to which outcomes are computed using quantitative criteria and behavioural models as opposed to participative processes where the actors are presented with different alternatives that they discuss in person. One important consideration at this stage is to ensure that the plan for the UWCS is aligned with the overall city planning (e.g. waste, energy, transport sectors), and to achieve synergy where possible. With this in mind, it is generally useful to consult and involve external actors at this stage where necessary.

Individual organisations can define issues and strategic options for themselves using various other methods, the most well-known of which is SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats). In fact, SWOT analysis is a sort of System Scenario for the transactional environment, whereby aspects of the internal system are confronted with aspects of the external environment. The objective is to identify the internal strategies that would be required to deal with different external changes to achieve a particular vision. The Strengths and Weaknesses refer to the internal factors, and the Opportunities and Threats to the external factors. Whether these factors are positive or negative depends on whether or not they are conducive to achieving the vision. SWOT analysis is more comprehensive than some other more traditional methods of Impact Assessment, which focus on measuring the problems or issues and may overlook the opportunities.

By confronting the vision for the internal system with various possible changes in the external system, certain transitioning issues are identified and defined. These issues represent obstacles or limitations that are perceived as potential hindrances to the implementation of a plan. Some methods, such as SWOT analysis, also identify opportunities that may be benefited from in various ways. It is both the opportunities and the threats that a strategic plan deals with. The aim is to stipulate a pathway between the present state and the desired future state of the internal system, whilst accounting for these factors. Backcasting is an approach that can be used both for identifying issues and our strategic options and for selecting and designing a strategy. This approach is detailed in the next section.

### 2.2.7. How do we select & design a strategy?

Selecting a strategy is a process that depends heavily on the premises of the planners about what constitutes desirable or necessary change, the degree to which such change can be planned, and what a proper planning process entails. This process is also culturally dependent, with some societies emphasizing the need for broad stakeholder involvement in decision making processes and others stressing the need to be decisive and demonstrate top-down leadership. Whatever the case, it is essential that the roles and responsibilities of different actors are clear from the outset. If stakeholders are under the impression that they have decision making authority and real influence over the selection of a strategy, for example, then serious problems can arise if the planners view their opinions as informative or consultative and thus ignorable.

The theories associated with Integrated Water Resource Management and Sustainable Development hold that full stakeholder engagement is essential to proper planning processes and good governance. The idea is to coordinate and harmonize the various responsibilities and tasks of public bodies together with those of the stakeholders in a UWCS. Theoretically this should result in wider community support, more intelligence through a broader range of data and ideas, enhance public sector or corporate reputation, and create greater community support for the plan. But active and substantive stakeholder involvement in actual decision-making processes has proven to be very difficult to achieve. The dominant management model in the water sector is generally still a monocentric one, whereby a limited number of organisations oversee the implementation of plans in a centralised way. In practice, participation may even become an end in itself rather than a means of benefitting from the diversity of views available. But from a theoretical perspective the process of engaging stakeholders goes beyond participation only. It also involves creating opportunities for learning and reflexive decision making (Wester, 2010).

There has been much research done in Europe recently to help implement the theories of stakeholder engagement. Several recent European research projects (e.g. HARMONICOP, NEWATER, SWITCH, and CONVERGE) have developed and tested knowledge and methods for applying these approaches. Generally speaking, these approaches involve some form of Social Learning, which has been recognized as a “transitional and transformative process that can help create the kinds of systematic changes needed to meet the challenge of sustainability” (Wals, 2007). The basic idea is to collectively develop new insights using reflexive thinking that employs the diversity of perspectives and understandings at hand (Daniell, 2010). Successfully applying these theories in practice is not self-evident (Pahl-Wostl et al. 2007; Muro and Jeffrey, 2012). It has proven essential that a suitable learning environment is created along with professional facilitation of the desired learning process (Jiggins, 2007). Social Learning is more of a philosophy or approach than a method and various methods can be used within this paradigm. One such suitable method is backcasting.

Backcasting is a method that is particularly useful when (1) projection models (based on trends) predict outcomes that don't match the normative target/vision i.e. the desired outcome is unlikely; and (2) the system is so complex or the time horizon is so distant that the most likely states are unknown and a form of accountability is required. Backcasting can also be useful for avoiding the pitfall of overestimating historical determinism, which erroneously reduces the possible futures to that which is presently considered plausible based on past trends. To put it simply, backcasting is the assessment of the present state from the perspective of a normative (desirable) vision or target. This is a fundamentally different approach to projecting past trends into the future to predict possible states.

Since backcasting is generally used for complex systems involving various stakeholders, it is usually important to involve these actors in the previous step of defining the vision. Backcasting can be done based on principles (e.g. checkmate in chess) or an image (e.g. a puzzle). Multit-criteria analysis can be useful for, and integrated with, the definition of principles for backcasting. The process of backcasting involves 4 main steps (Figure 4): set a normative quantitative target (1a) or opinion based vision (1b.); make projections to determine whether the target or vision is likely to be reached (2); if projections based on past trends show that reaching the vision is unlikely then determine possible causal pathways from the vision back to the present using models, fuzzy logic, narratives etc. (3); choose one of these pathways as strategy (4); undertake the first steps in the strategy (5); evaluation (6).

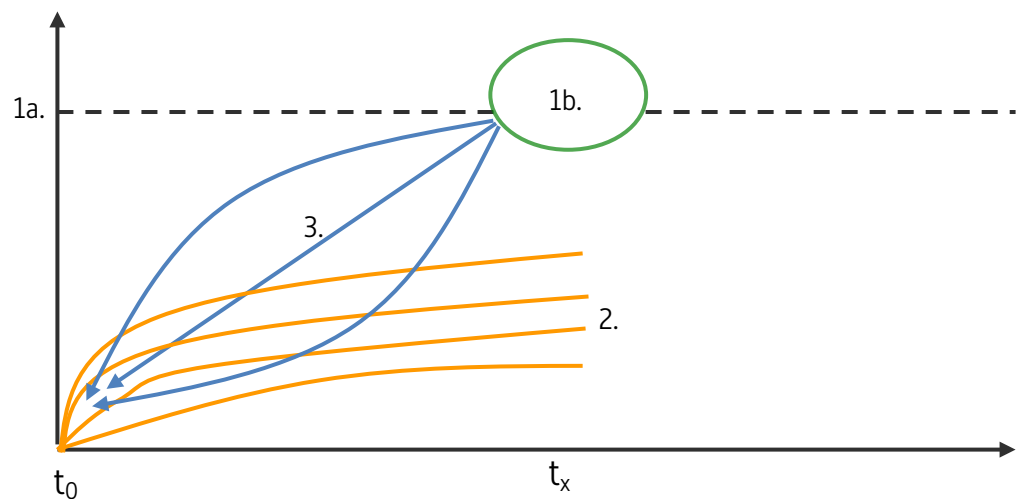


Figure 4. Steps in Backcasting  
(adapted from <http://www.naturalstep.org/>)

As mentioned earlier, Backcasting can be a useful method within the general approach of Social Learning. To facilitate learning, iterations are essential to the backcasting process. Planners adjust their original strategies when presented with possible second

and third order consequences once they have had time to reflect. Step 3 in Figure 4, which involves finding possible pathways from the vision back to the present, thus also involves reassessment and adjustment of the vision based on new insights. Applying this process also allows issues that have been highlighted to be addressed within the strategy. Backcasting can be combined with other methods, such as Multi-criteria Analysis, to decide upon a certain strategy. It can be helpful to remove the planners from the present situation by taking them to a physically foreign location and devoting time and energy to envisioning the future. Methods for developing roadmaps between the present state and the vision for the UWCS are explained further in TRUST Report by Hein et al. (2012). The result of the backcasting process is typically a rough pathway defining milestones & transition measures.

The next step towards implementing a strategy is to complete a detailed roadmapping process by addressing practical concerns and operationalising the strategy by making action plans. The people involved in designing practical action plans need to translate the broad and abstract initiatives and goals into day-to-day projects and tasks. These people may need different competencies and more specialist knowledge than those involved in earlier planning phases. One common problem that needs to be addressed when designing detailed action plans is to translate the conceptual language into words and ideas that will be understood by those will implement the plan. The intention of the strategy, and the value of the vision, need to be retained during this translation step.

Basic management instruments, such as timelines and budgets, are generally used to sequence measures and specify the available resources. Action plans are typically recorded in tables that specify tasks (who does what), time horizons (when), and resources (financial and physical). At this point is also essential to specify the roles and responsibilities of the actors who are to implement the strategy, the beneficiaries or target groups, and to design an official evaluation process so that progress can be assessed. Official contracts and agreements are often signed and authorized at this stage. Sequencing tasks can involve detailed logistics, or more general descriptions, depending on the nature of the plan. Strategic plans are generally divided into short-term, medium-term, and long-term goals. This allows for differentiation of the level of detail depending on the time horizon. This stepwise approach can also be useful for keeping people motivated and maximizing flexibility and adaptive capacity during the implementation of the strategy.

### **2.2.8. How can we implement and iteratively adapt the vision and strategy?**

A strategy can, explicitly or implicitly, involve transitions in governance structures, organizational culture, human resources, and other less tangible aspects than the physical, technical changes that constitute the infrastructural state of an UWCS. Implementing social changes requires totally different skills and approaches than the physical interventions. Water utilities are generally more than capable of planning and executing the engineering tasks involved in a strategy. The main issues tend to arise when ambiguous social, political, and cultural processes assert influence on the



implementation of the plans. It is important to recognize this fact from the outset and to learn from the past by analysing and accounting for known issues, limitations, & considerations. It is also essential to define the roles of the various actors, specifically stipulating which actors are to be involved in the implementation, evaluation, and/or adaptation of the strategic plan.

Annual progress reports can be used to demonstrate the transparency of the evaluation process and build confidence among the parties involved in strategic planning and the general public. It is generally worthwhile considering various options for documenting and communicating the vision, strategy, and progress internally and with the wider community. Online media can facilitate more interactive and clear communication of information, for example using new Graphical Information Systems, Augmented Reality, and videos or photos to show the process and results. Maintaining support for a vision is essential to gaining and keeping the mandate to implement the strategy. Various performance indicators can be used to monitor progress. Factors that may have been defined in Multi-criteria analysis during earlier planning stages can also be useful for evaluating progress. One common method that is used to simplify the evaluation process is to phrase the action plans using the SMART approach. Following this approach, each task should be:

- Specific: a clear definition of what is to be achieved (who, what, where, why, which)
- Measurable: include quantifiable amounts (such as days and dollars)
- Attainable: realistic considering the current state of the internal system
- Relevant: to motivate those implementing the strategy if must be meaningful to them
- Time-bound: a commitment to a deadline

If the short-term tasks have been defined using enough detail then quantitative evaluation of progress is relatively straight forward. More qualitative evaluation may involve interviewing sample populations within the community to assess the level of satisfaction. External stakeholder groups can also be given a formal role in this process. It is advisable to include in the plan a schedule showing when and how progress on the plan will be evaluated. To be an adaptive strategic planning process (Figure 1) this schedule must also include plans for more fundamental review of the vision itself and the corresponding strategy. Perceptions, values and goals change with time and with shifting circumstances. The key to adaptive planning is to periodically ask the fundamental questions: where are we now? and where do we want to be? It can be distracting, destructive, and costly to undertake fundamental re-evaluation of the vision too frequently. A timely moment is often at the point when the short-term plans have been achieved and the long-term goals need to be translated into more detailed action plans.

In the next section we review actual strategic planning practices and results based on detailed analysis of 12 strategic plans developed by leading water utilities, revealing similarities & differences. In the final chapter we propose guidelines for the strategic planning principals, practices, and products that can be seen as best practices for European water utilities.

### 3. PRACTICES

#### 3.1. Who are we?

Chapter 2 presented the definition of the boundaries of the internal system, the transactional environment and the external environment as a crucial first step in any strategic planning process.

For the majority of plans, the internal system has been implicitly defined in terms of (1) which part of the water cycle system is addressed and (2) geographical boundaries. The plans vary as regards the part of the water cycle system that is taken into account. Auckland, Adelaide, Amsterdam and Sao Paulo cover the entire water cycle (water supply, wastewater, stormwater). Koln covers wastewater, flood protection and surface water quality. Mozambique and Portugal cover water supply and wastewater, Madrid focuses on water supply and to a lesser extent on stormwater. East Bay, Fergus-Elora and Maputo address water supply.

In most of the plans the internal system can be deduced from, for example, the scope of the background information that is presented (the assessment of the current state). From the strategic planning documents it appears that utilities have not *explicitly* engaged in defining the internal system, the transactional environment and the external system. Nor have they clearly indicated the area of control related to the internal system, the area of influence related to the transactional environment and the independent environment related to the external system. This has some important consequences. It is highly likely that water utilities have a role to play in the transactional environment beyond their core business (the internal system). Especially in urban planning, water utilities are dependent on the plans and actions of stakeholders from other sectors and citizens. What is more, they share responsibility for the success of urban planning with these parties.

As indicated in chapter 2, examples of methods used for answering the question ‘who are we?’ include the ‘ecological handprint’ and constructing stakeholder maps. Such maps are also relevant for answering the next step in the strategic planning process, which deals with defining the current state of the internal system. Based on the idea that actors in urban planning are mutually dependent, it might be expected that the strategic plans under study recognize the diversity of stakeholders and citizens as both beneficiaries of the plan and as parties involved in development, implementation and evaluation. Indeed, most plans mention a diversity of beneficiaries, ranging from local authorities in the water sector to the industry and from non-governmental organizations to individual citizens. Clear identification of (the perceptions of) the target audience, however, is not put forward in the majority of plans. An inspirational example here is the strategic plan ‘Taking Care of Water’ from Thames Water. In the preparatory stage, the utility invested in getting to know the thoughts of customers as regards the services. It

did so by conducting consultative discussions ('deliberative research'), stakeholder discussions, and a 'stated preference survey' of over 1,500 customers to explore their willingness to pay for different types of service. Not only does this strategic plan present the method of citizen and stakeholder involvement, it also gives insight in their responses and – in turn – Thames Water's response.

Thames Water did involve stakeholders from both within and outside the water sector. This also applies for the utilities that designed the strategic plans for Auckland and East-Bay. For East-Bay a Community Liaison Committee was established to take care of discussion with, and dissemination to, representatives from e.g. industry, environmental interest groups, and community advocacy groups, including the American Chamber of the Commerce, a local refinery, a Home Builders Association, Health Services Departments, Environmental Defence and Economic Development Alliances. The plans for Portugal, Mozambique, Amsterdam, Adelaide and Fergus-Elora were developed with a variety of partners within the water sector. For Sao Paulo, Koln and Maputo the plan's development took place within the utility itself.

When it comes to implementation, there are statements to be found in most of the plans that underline the importance and relevance of involving organised stakeholders and citizens. It is less clear, however, whether or not they are actually contributing to the implementation process. At the same time, there are examples of more or less permanent structures that were specifically created to organize involvement in this stage of the planning process. An example in point is the structure for Auckland (Figure 5), being composed of the Community Issues Advisory Group, Receiving Environment Expert Group, Technical Steering Group (from key Participating Council and Network Operator Organisations) and Project Steering Group (from key Participating Council and Network Operator Organisations).

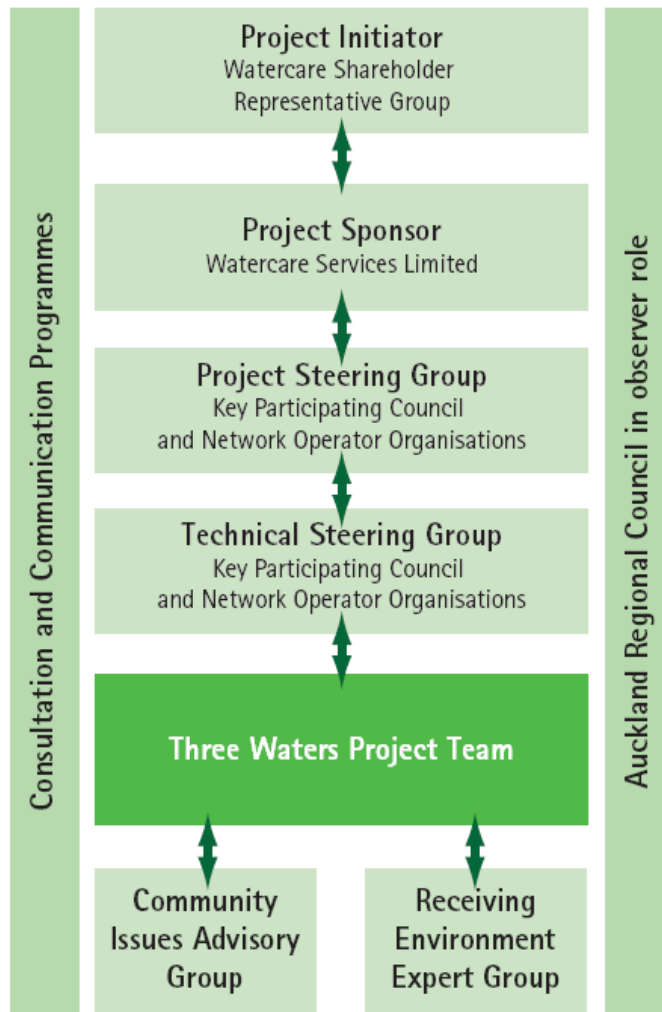


Figure 5. Predefined framework for relationships between groups with different roles (Watercare, 2008: 2)

**Guidelines:**

- Pay attention to defining the focus of the strategic plan by delineating the sphere of control and influence of your utility.
- As the first step in the planning process, consider which parties (e.g. multi-discipline, multi-sector, multi-level actors) need to be involved in the different steps (e.g. the selection and design of a strategy, or just definition of the vision).
- Manage the expectations of stakeholders by communicating what status their input has in the planning process.
- A permanent structure for stakeholder involvement can be useful for developing a productive working relationship, formalizing roles, and generating a shared feeling of responsibility.
- Consider the different motives for making a strategic plan and which ones need to be communicated with a wider audience.

**Guiding references:**

- Gharajedaghi (1999) on system boundaries.
- Hemmati et al. (2002) on stakeholder mapping.

### 3.2. Where are we now?

All of the strategic plans under study were developed at the request of governmental bodies, being local, regional or national authorities. Some of the plans were created explicitly in response to recognition of the relevance of dealing with trends and the need to implement (inter)national policies. For example, implementing a new national law for the regulation of integrated water supply and wastewater services in Sao Paulo and implementing the Water Framework Directive in Koln. Furthermore, plans are developed in response to the perception of actual or potential water problems. For example, low coverage levels of water and sanitation services in Mozambique's rural areas, drought in Adelaide, and threat of water shortage in Fergus-Elora. Additionally it is conceivable that the development of a strategic plan is intended to create support for a governance transition. This might have been the case in Auckland, where previously discrete council services were integrated into the sole responsibility of Watercare, including retail water and wastewater services directly to homes and businesses.

To provide a reference point, the current state of the internal system is assessed in most cases. This mainly concerns the physical assets and resources. Only in a few cases are social conditions (internal and external perception of the identity of the organisation, organisational structure, roles responsibilities etc.) taken into account. Focusing on physical assets and resources alone might ignore the diversity of perspectives of stakeholders in the transactional environment. This can be a time consuming process on the short term, but – at the same time – it might provide a solid basis for the next steps and support for the plan’s implementation later on.

**Guidelines:**

- As a point of reference, define the current state of the internal system including, besides physical assets and resources, social conditions.

**Guiding references:**

- Wackernagel and Rees (1996) on Ecological Footprint.
- Rohwedder (forthcoming) on Ecological Handprint.

Guiding references:

### 3.3. Where do we want to be?

The stage of defining ‘where do we want to be?’ concerns the development of a clear vision. A vision represents the desired state of the internal system and, to some extent, the transactional environment. The perceptions and interests of stakeholders and citizens in the UWCS are often diverse. Dealing with this ambiguity involves sharing perspectives and reaching consensus about the desired state. Defining such visions can therefore be a very complex process. Only a few of the strategic plans under study presented a clear vision. The plans for Adelaide, Koln, London and Sao Paulo, for instance, indicate what might happen and how utilities can respond. These plans are based on a perception of necessity rather than a normative vision. The plans studied tend to focus on developing secondary and practical targets or instead explore broad and abstract goals; the description of a desirable future state is generally lacking. In Adelaide, for instance, the practical target of building a 100-gigalitre desalination plant is a central part of the vision, while this is actually a means of achieving the normative goal of ensuring adequate supply of water for the population.

The planning horizon varied significantly between the different plans. The plan for Auckland had the longest temporal horizon, reaching 92 years into the future, while Amsterdam’s 4 year plan was the shortest. Several plans also defined short, medium, and long term horizons to allow for more detailed treatment of shorter term goals. Such

phasing of projects helps to operationalising long term ambitions into practical action plans, which is a common approach used in strategic planning.

**Guidelines:**

- As regards a vision, will is prior to necessity and capacity. Define a clear vision for the internal system and the transactional environment.
- Distinguish between short- medium- and long-term objectives to translate abstract future ambitions into practical actions.
- Be aware that dealing with different perceptions in planning processes involves sharing perspectives and reaching consensus about the desired state. Defining such visions can therefore be a very complex process.

**Guiding references:**

- Wals (2007) on social learning.

### 3.4. How might our environment change?

All strategic plans address trends in the external environment. And most plans have separate sections on possible futures, trends and pressures. Among the most commonly mentioned are climate change, population growth and increasing water demand. Interestingly, the majority of the trends come in the form of predictions based on uni-dimensional extrapolations (using e.g. computer models). The combined effect of various pressures and trends (the interdependency of pressures and trends) is addressed to some extent. E.g. hotter and drier summers and population growth will increase water demand during the summer period and in general. None of the plans accounted for more complex combinations of demographic, economic, social, technological, ecological and political pressures and trends (e.g. population growth, hotter and drier summers and community expectations). When little attention is paid to possible interdependencies, utilities run the risk of overlooking relevant threats and challenges by underestimating the complexity of reality. For example, the decision to invest in large scale desalination depends not only on the available technology, but also on energy costs, the economic climate, and community expectations



**Guidelines:**

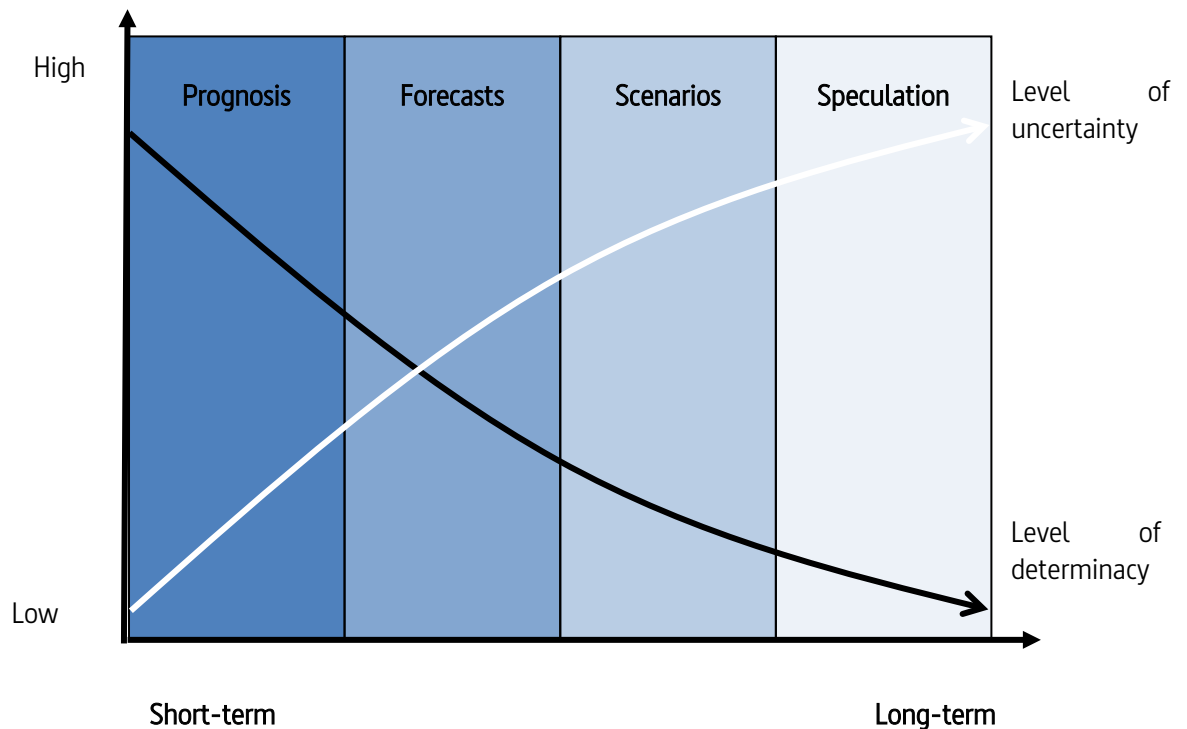
- Consider a broad palette of trends and the interdependencies between them.
- Select a method of futures research that matches the time horizon of your plan.

**Guiding references:**

- Börjeson (2006) on scenario planning.
- EU FP6 project 'SCENES'.
- EU FP7 project 'PREPARED'.

### 3.5. Is our vision robust?

Determining the robustness of the strategic plan is the next step. Here the vision for the internal system ('Where do we want to be?') is confronted with (1) the current state of the internal system ('Where are we now?'), and (2) the various probable and possible future states of the external system ('How might our environment change?'). As described in chapter 2, context scenarios are the most comprehensive way of testing the robustness of a vision. But forecasts and what-if scenarios can also be used, depending on the level of determinacy and uncertainty (Figure 6). On the shorter term (0-5 years), forecasts can be useful for trends with relatively certain probability distributions such as demographics. What-if scenarios may be useful for testing known weaknesses of the internal system against extreme conditions in the external system. Generally, there is no reference to a confrontation of the questions 'Where do we want to be?' with 'Where are we now?' and 'How might our environment change?'



*Figure 6. Methods for exploring the future (Nekkers, 2006)*

The different plans make quite some reference to concepts such as robustness, resilience, flexibility and adaptive capacity but these terms are seldom explicated. The planners in Maputo invested in new strategic alliances and thus flexibility by strengthening their adaptive capacity making use of the relative strengths. The plan for rural water and sanitation in Mozambique includes in diverse private initiatives with the intention of reducing the dependency on national state finance. Responsibilities are reallocated to lower administrative levels and to market parties. The underlying assumption is that resilience will be improved through diversification. This is also the case for East Bay, where multiple parallel projects are pursued. In Adelaide, there is much reference to concepts such as adaptive planning and continuous monitoring. However the practical solution taken is to build a desalination plant to decrease the dependency on the river system. The primary investment is thus geared towards robustness: a solution that is less sensitive to shock events and changes in the external environment.

**Guidelines:**

- Resilience can be achieved from a perspective of robustness and/or flexibility. It is useful to consider which approach(es) matches the local circumstances.

**Guiding references:**

- Meijer (2007) on resilience of anthropogenic systems.

### 3.6. What are the issues and our strategic options?

A strategy is a series of actions for attaining specific goals or objectives (vision) that have been thought out, defined, and recorded in advance. This series of actions represents the proposed pathway between the current state and the desired future state of the UWCS (internal system). In the plans under study, Multi-criteria Analysis is used in some cases (Auckland and Maputo). The plan for Auckland explores various response strategies for the numerous transitioning issues based on input from expert groups and stakeholders who defined criteria that were used to evaluate the various options (multi-criteria analysis). The plan itself does not prescribe a certain strategy for all locations, but provides an overview of options that were to be discussed with the stakeholders in the future.

**Guidelines:**

- There are various methods for defining the strategic options and selecting a strategy. The appropriate method depends on the level of stakeholder development, the variance between options, and the complexity of the system. Be aware that the methods used influence the outcomes and make an informed choice.

**Guiding references:**

- Relevance tree, Multi-criteria analysis, SWOT analysis,

### 3.7. How do we select and design a strategy?

Review of the options to decide on preferred solutions is considered to be a separate step. For the wastewater strategy in Auckland the results of this step are presented in the plan as preliminary outcomes. The choices are substantiated extensively with much attention to the decision making process. The conclusion is that the “North Eastern WWTP is the preferred second regional wastewater facility based on currently available information.”

#### Guidelines (as in the previous step):

- There are various methods for defining the strategic options and selecting a strategy. The appropriate method depends on the level of stakeholder development, the variance between options, and the complexity of the system. Be aware that the methods used influence the outcomes and make an informed choice.

#### Guiding references:

- EU projects HARMONICOP, NEWATER, SWITCH and CONVERGE on stakeholder engagement.
- Muro and Jeffrey (2012) on the importance of structures for the success of stakeholder engagement.
- The natural step on backcasting (naturalstep.org).
- ‘SMART’ly defined strategic options and strategies.

### 3.8. How can we implement and iteratively adapt the vision and strategy?

Since the implementation of the plan logically follows its design and adoption, information on this step was generally not included in the planning documents themselves. The present study did not include exhaustive analysis of later review/evaluation documents. In general, progress on the implementation of plans was not well documented. Further analysis of subsequent planning and evaluation documents for Auckland and Adelaide revealed that progress was going according to plan. The plan for Auckland involved quite and adaptive process and long term horizon but any changes to the plans have been well documented and the progress reports are very detailed. Review of the plan for Portugal focused on progress of physical indicators, such as the increase in water and wastewater services coverage and water quality. The

review also mentions complications associated with reliance on governmental decisions for interventions such as the definition of tariffs, and increasing private sector involvement, which are political issues.

The degree to which plans have been completed depends on the time horizon of the plan and the period to date since its publication. The plan for Köln, for example, was completed so recently that progress reports have not yet been prepared. In general, it can be said that documentation of adaptive planning processes seems difficult in practice. Evaluation is generally not included in the original planning document, and also underrepresented in later stages of the planning process. In cases where adaptive planning is applied, which involve a moving target and iterative steps, it is conceivable that planners struggle to find an optimum frequency of evaluating and reporting. For example, planners may question the relevance of evaluating progress on plans that may have changed within a year.

**Guidelines:**

- An adaptive planning process assumes that the plan will be continuously optimised based on progressive insight. Learning through evaluation is thus essential.

**Guiding references:**

- Annual progress reports.

## 4. CONCLUDING REMARKS

In the previous chapters we presented an ideal-typical picture of strategic planning processes (chapter 2) and an analysis of some actual strategic planning practices from around the globe (chapter 3). For each of the steps in a strategic planning process, we identified guidelines and – when possible – provided some examples of guiding references (being both references to literature and to key words).

In the plans under study, it became apparent that in many cases the current state (Where are we now?) and trends (How might our environment change?) are described. This also goes for specific strategies and options for the coming years (How do we select and design a strategy?). All the other stages get less explicit attention. These are questions of identity (Who are we?) and vision (Where do we want to be?), a vision's robustness (Is our vision robust?), the various strategic options (What are our strategic options?), the selection of a strategy (How do we select and design a strategy?) and the actual implementation (How can we best implement our strategy?). In chapter 3 it has been addressed why going through these steps are very relevant for strategic planning in urban water management. The first planning step of describing the organisation's identity has far reaching consequences for all following steps. Distinguishing between the internal system, transactional environment and external system is important, as objectives in these different spheres ask for different strategies. Within the internal system, the utility itself can directly influence what is happening. For issues in the transactional environment, a utility needs other stakeholders to realise its objectives.

This Report 12.1c might contribute to making utilities aware of what a strategic planning process entails. In practice, it will be very difficult to detailedly execute each of the steps. The Report is by no means the one and only way to follow. It is, however, a basis which might remind utilities of the range of possibilities they could consider in strategic planning for urban water management.

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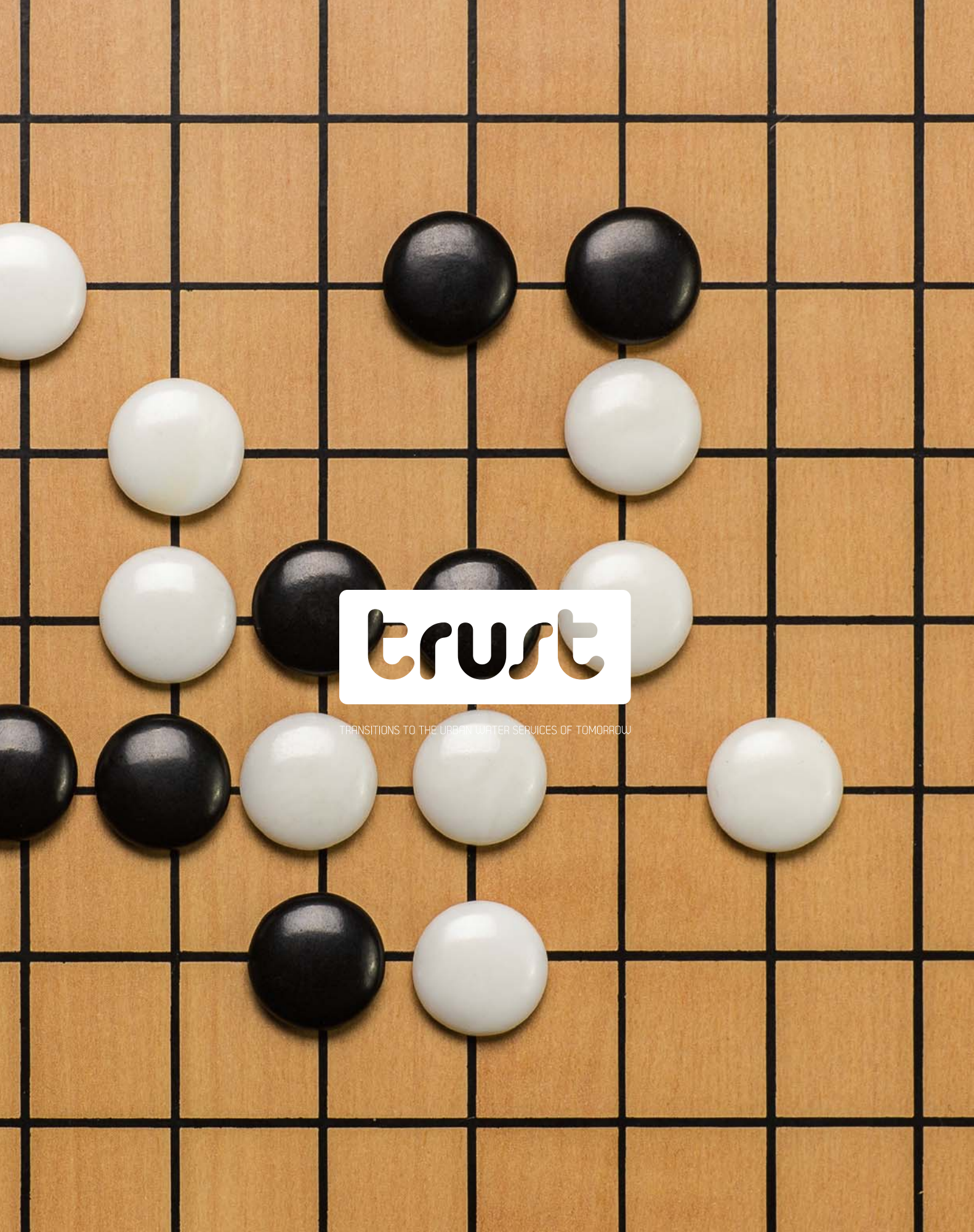
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