

Scenario Planning: Making Strategic Decisions in Uncertain Times

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Many Southwest communities have in recent decades grown at an unprecedented rate. These growth centers are often in areas where aquifer overdraft and its environmental consequences have become the regional norm. The current financial debacle has temporarily lessened the development pressure, but after the rubble clears, growth is likely to resume.

To meet existing and future supply needs, many communities are shifting to renewable water resources. Some plan to import groundwater mined from distant aquifers. For others, municipal effluent is increasingly prized as a locally generated renewable supply. Seawater and inland desalination are being discussed more frequently. As this search for “the next bucket” becomes more pressing, so does the environmental need to reserve water for vulnerable habitats and threatened species. And after years of denial, water utilities, large-scale wholesalers, and state water planners have begun considering the uncertain implications of global climate change.

The needs of water users to acquire additional water resources and ensure supply reliability are leading to greater regional interdependence—fertile ground for high-stakes conflict, creative cooperation, and uncertainty. Planners and decision makers are facing challenges unforeseen a decade ago. In this changing planning environment, utilities must make difficult, highly consequential decisions. When so many things are in motion, being able to accurately predict the future becomes less likely. But it is possible for a water utility to be better prepared for what may lie ahead.

Understanding the Planning Environment

In 2004, the City of Tucson Water Department updated its long-range plan to reassess its needs through 2050.

This analysis generated a range of resource, system-infrastructure, and demand-management options laden with assumptions and uncertainties.

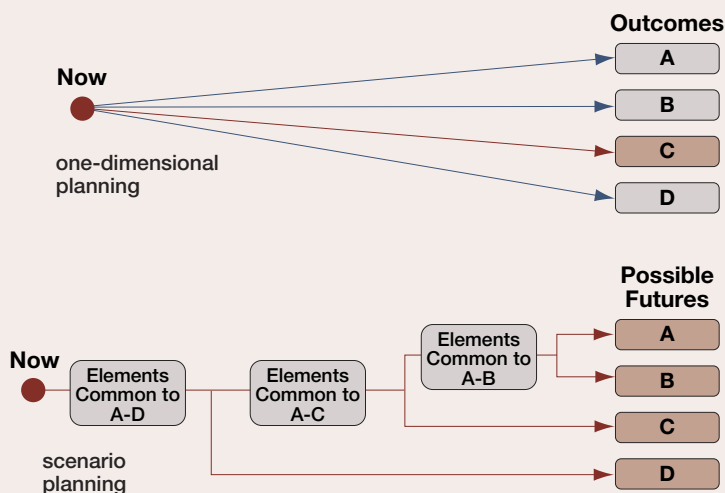
Instead of emphasizing what is known and predictable, scenario planning focuses on the critical uncertainties specific to a given issue.

For many utilities, a review of actionable options would likely result in a plan with a clear expectation about the future. As shown in the figure below, a single-future, one-dimensional perspective frequently leads to selecting the most-probable or preferable outcome and the planned implementation of one or more projects to accomplish it. This approach is most appropriate when the scope of the effort is well-defined and the range of future uncertainty is limited. However, such an approach could prove risky if applied to a planning environment where assumptions or conditions can significantly change over time. Such changes could cause major initiatives to fail, creating organizational trauma and loss of public trust.

To avoid the potential pitfalls of single-future planning, Tucson Water utilized scenario planning in its integrated planning process. The method has been around for decades but gained widespread popularity

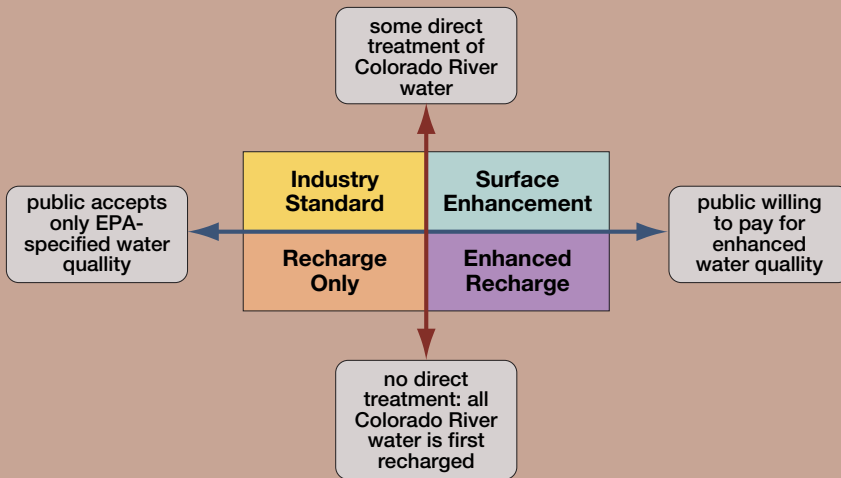
in the 1990s after Schwartz (1991) published *The Art of the Long View*. A more formal and in-depth presentation is provided by Van der Heijden (2005) in *Scenarios: The Art of Strategic Conversation*. By analyzing the driving forces that motivate current events and extrapolating relevant trends into the future, one can strategically define a range of possible futures, or scenarios. This approach can provide a long-term planning context for making important decisions.

Instead of emphasizing what is known and predictable, scenario planning focuses on the critical uncertainties specific to a given issue. Multiple scenarios are developed, each based on a unique combination of the critical uncertainties. The aim is not to capture every possible future but only those that can serve as end members in a range of possibilities. By identifying and sequencing all the projects and initiatives that would be needed to realize each future scenario, an implementation pathway can be developed. If all the individual pathways are stacked on top of each other (see lower figure, below), many projects and initiatives overlap in time—these are



The one-dimensional planning approach (top) is appropriate when the scope is well-defined and the range of future uncertainty is limited. The scenario-planning approach (bottom) allows progress along a path of elements common to many possible futures, providing greater flexibility for responding to changing possibilities.

The Matrix of Scenario Planning Futures



Tucson Water's central issue was how to use its full allocation of Colorado River water. Among the many driving forces that could impact how this water is used, two critical uncertainties were identified. 1) Would the public accept direct treatment, or would it require all Colorado River water to first be recharged? 2) Is the public willing to pay higher rates in order to receive water with higher quality? These uncertainties comprise the primary axes of the matrix, with the range of possible options forming the end members (gray boxes). Four future scenarios for use of Colorado River water (inner boxes) are then developed incorporating the end-members. In subsequent steps, the projects and programs required for each scenario are outlined, and those elements common to each define the path forward.

the common elements. The overall purpose of this approach is to identify the common elements that will strategically place an organization in a highly flexible, adaptable position when change and its surprises inevitably occur (Schwartz, 2003).

The Scenario Planning Journey

Water professionals are becoming increasingly aware of scenario planning as a tool to help manage uncertainty in turbulent times (Means and others, 2005). The following is an overview of the scenario-planning process presented by Schwartz (1991).

First Steps: Issues and Drivers

The first step is to identify one or more pivotal issues in order to prepare for a significant decision. For some utilities, the critical issue might be the increasing vulnerability of currently available water resources and how best to ensure supply reliability in future years. For others, it might be whether to prepare customers for the eventual indirect potable reuse of effluent and if so, when and how. Identifying the central issue can be accomplished through a brainstorming session involving a diverse group of staff members with the active involvement or tacit support of decision makers. The group should be prepared to enter into a vigorous vetting process—discussions can become contentious if there are strong opinions to work through. The objective

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is to arrive at consensus agreement on the central issue in order to move forward.

Next, the group generates a list of the driving forces that could have bearing on the central issue. Once the list is established, the driving forces are ranked to identify those considered extremely important and highly uncertain. These become the “critical uncertainties” in the next phase.

Scenario Definition: Critical Uncertainties and Stories of the Future

In subsequent meetings, the group determines which of these driving forces will be used to frame the scenario matrix. The matrix framework is constructed by placing the identified critical uncertainties on its defining axes. The boundaries of each future are thus defined by the polar extremes of the critical uncertainties. An example from Tucson Water’s *Water Plan: 2000-2050* is shown on page 23.

The planning group subsequently develops a sufficiently complete description of each unique future to give it substance—to make

it real. This step requires creativity and imagination. The participants should identify the potential issues that must be managed or overcome given the uncertainties involved. Each end-member future essentially becomes a different story or scenario. To develop a more flexible, multidimensional view of the future, *each story/scenario is considered equally likely to occur*.

Tangible Results: Pathways and Common Elements

The end-member future scenarios collectively establish a range of future possibilities. The group plots an independent pathway, a sequence of projects and programs, to realize each unique future based upon its specific characteristics and issues. Despite differences among the developed pathways, similarities and overlaps will occur; this commonality indicates which projects and programs would be most viable over time.

Parting Thoughts

By following the path of common elements, capital investments can be prioritized and directed toward projects that will

most likely be useful assets over time. If circumstances shift and retrenchment is needed, a strategic retreat to an earlier junction on the common path is more likely than a catastrophic collapse back to “square one.” The scenario planning process can be revisited over time to adjust the range of possible futures as planning assumptions change, old possibilities fade, and new ones emerge. This ensures that strategic flexibility and adaptability are maintained.

A detailed example of how Tucson Water applied this method can be found in Appendix D of Water Plan: 2000-2050 (reference below). Contact Ralph Marra at ralph.marra@tucsonaz.gov or Tim Thomure at timothy.thomure@hdrinc.com.

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