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Scenario Planning
by Sherry B. Ways and Cynthia Burbank

This new paradigm for decisionmaking is helping communities and States prepare for the future.

(Above) In a scenario planning process, participants at Envision Utah workshops work in small groups such as this one to visualize a desired future for their community.
Photo: Envision Utah.

Nobel Prize Laureate Niels Bohr once said, "Prediction is very difficult, especially if it is about the future." With land development occurring rapidly, pressures on the environment increasing, congestion levels growing, housing costs rising, and the population aging, what is to be done?

These quality-of-life concerns and others appeared to be foremost on the minds of citizens in the Greater Wasatch region of the Salt Lake City, UT, metropolitan area when they took control of their future through a scenario planning process called Envision Utah. As with many regions, Utah faces serious challenges of rapid growth and deficits in needed infrastructure. "The Greater Wasatch region could not continue to grow in the future as it had in the past," says Ted Knowlton, planning director at the Coalition for Utah's Future, which sponsors Envision Utah.

Formed in 1997 as a public-private partnership, Envision Utah guides the development of a broad and publicly supported growth strategy to protect the State's environment, economic strength, and quality of life. Instead of using a typical approach to planning that involves one forecast and one solution,

participants in a series of workshops convened by Envision Utah set out to develop and evaluate a range of alternative futures. Participants developed four possible alternatives for future growth and identified criteria-including total land consumption, average daily vehicle miles traveled, and air quality-to evaluate each alternative.

In a subsequent public survey, residents voted for their preferred scenario. Based on the scenario chosen, Envision Utah generated a vision document with 42 specific strategies. Envision Utah now is working with the various governments in the region to implement those strategies.

What Is Scenario Planning?

The scenario planning process employed by Envision Utah is an analytical tool that can help prepare for the future by providing a framework for developing a shared vision. In other words, scenario planning is a part of strategic planning that incorporates assumptions, risks, and environmental factors by using scenarios to present various situations that may affect the future. Transportation scenario planners analyze various forces that affect growth, such as the economy, transportation, health, the environment, and land use.

Scenario planning is applicable at the statewide level or for individual metropolitan areas. Scenario planners test various future alternatives that could meet State and community needs. A defining characteristic of successful scenario planning for the public sector is that it actively engages the public, the business community, and elected officials in identifying the growth trends and tradeoffs, gaining a mutual understanding, and incorporating their values into future plans.

Envision Utah is one of many examples. Other communities and regions that have used scenario planning include Sacramento, CA, which called its process the Sacramento Blueprint; Chicago, IL (Chicago Metropolis 2020); the Delaware Valley Regional Planning Commission; Charlottesville, VA (Jefferson Area Eastern Planning Initiative); the Idaho Transportation Department (Idaho's Transportation Future); and Binghamton, NY (Binghamton Metropolitan Transportation Study).

Scenario planning offers the following benefits:

- Provides an analytical framework and process for understanding complex issues and responding to change
- Facilitates consensus building by giving communities the capacity to participate actively in planning
- Includes tools and techniques to assess the impact of transportation and other public policy choices on a community
- Allows the opportunity to recognize the impact of tradeoffs among competing goals
- Yields an enhanced decisionmaking framework
- Helps ensure improved management of increasingly limited resources

The Federal Highway Administration (FHWA) actively encourages and supports scenario planning to help citizens, businesspeople, and government officials understand the impacts of growth, especially the relationship between transportation, social and environmental issues, and economic development. This relationship is a two-way street: Growth and development affect transportation performance, while transportation affects social, environmental, and economic development.

Envision Utah promotes multiple transportation options, accommodating bicyclists on busy urban streets as well as pedestrians, motorists, and users of public transportation.

Scenario Planning and Transportation Planning

Scenario planning enhances regional transportation planning, which is a comprehensive, holistic look at the needs and the future of a region and its inhabitants. (See "Transportation Planning" for more details.) Scenario planning takes the transportation planning process a step further by increasing participants' awareness of external forces of change (such as population growth and aging, immigration, and economic factors) and by enabling participants to consider alternative approaches to shaping their future, including policies related to land use, the environment, and transportation.

A Brief History

According to Keith Bartholomew in "Land Use-Transportation Scenario Planning: St Association of Collegiate Schools of Planning 2004 Annual Conference, one of the f the Roman Empire. To prepare for battle, commanding officers used the technique t move by providing a range of possible actions and reactions. Many centuries later, t used a modern version of the Roman military's application to assess potential nucle according to Bartholomew.

Christopher Zegras, Joseph Sussman, and Christopher Conklin in the 2004 article " Regional Transportation Planning," in the *Journal of Urban Planning and Developme* planning" to Royal Dutch/Shell, which first began applying the process in the early 1 for the economic downturn of the mid-1970s that resulted from the 1973 oil crisis. La planning to anticipate future market conditions and reduce business risk, particularly

Inevitably, the process involves difficult tradeoffs, especially regarding land use policies; therefore, public participation is essential to raise awareness and foster collaborative thinking. Scenario planning enables participants to realistically evaluate a wider variety of potential futures and determine a community's future.

"FHWA sees scenario planning as an enhancement of, not a replacement for, the traditional transportation planning process," says Gloria M. Shepherd,

director of the FHWA Office of Planning. "It enables communities and transportation agencies to better prepare for the future."

Scenario planning highlights the major forces that may shape the future, such as an aging population moving into an area perhaps calling for more transit opportunities or dense land use calling for additional road capacity. Scenario planning identifies how those forces might interact, rather than attempting to predict one specific outcome. As a result, regional decisionmakers are better prepared to recognize the various forces shaping the future, to make more informed decisions today, and to strategize for meeting tomorrow's needs.

Transportation Planning

"Transportation has a comprehensive, well-supported planning process to shape de
director of the FHWA Office of Planning. Transportation planning first appeared in F
years ago, with the Federal-Aid Highway Act of 1962. The law requires States and n
for receiving Federal funding, to adopt long-range transportation plans for multiple m
planning must be "continuing, comprehensive, and cooperative."

Over the years, the emphasis on effective transportation planning has been strength
funding, and guidance and technical assistance provided by FHWA and the Federal
metropolitan regions have developed regional long-range transportation plans based
housing, employment, and other conditions 20 years into the future. Public involvem
with air quality standards, consideration of the environment, and intermodal coordina
transportation planning.

In fiscal year 2004, FHWA made more than $500 million available for State and met

Regional transportation planning is a collaborative process, led by a metropolitan pla
key stakeholders in a region. The process is designed to foster involvement by all in
community groups, environmental organizations, and the public-through proactive p
coordination with the State department of transportation (DOT) and transit operators

Transportation planning in a regional context provides the information, tools, and pu
system's performance. Transportation planning should reflect the city's vision for its
Charleston, WV, or Charleston, SC. The planning should include a comprehensive d
an evaluation process that encompasses diverse viewpoints; the collaborative partic
open, timely, and meaningful involvement of the public.

For more on the transportation planning process, see www.fhwa.dot.gov/hep.

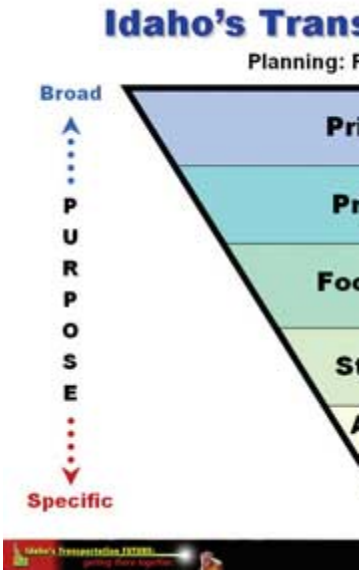
Idaho's Transportation Future: Getting There Together

As the final step prior to development of a draft vision for the State's transportation future, Idaho's Transportation Partners convened a summit on transportation scenario planning and policy. "The goal was to create an initial policy framework and to better understand the effect of not only making policy decisions for the future of Idaho's transportation system, but perhaps more importantly, the unintended consequences of different paths," says Matthew E. Moore, research program manager at the Idaho Transportation Department (ITD).

To better understand the impact that today's

decisions can have on tomorrow's world, participants in the summit used a scenario planning tool called the Quest model, which was developed in Vancouver, Canada. Quest is a visual interface tool that enables many models to work together to provide a projected future based on a number of policy decisions. The Quest model has more than 60 questions related to an area's economic base, transportation, housing, and health care. For Idaho's Transportation Future project, the transportation partners asked 12 policy questions that were primarily related to transportation and land use.

The participants used electronic townhall polling, which enables voters to make their choices anonymously, in combination with the Quest model to give their answers. "The questions generated productive discussions about the integrated nature of decisions," says Moore. "Many participants received a better understanding of the effect of being proactive on maintaining quality of life and meeting the mobility needs of the future. These discussions served to inform top-level priorities and policy decisions for the draft vision document and now for the final document."



Idaho's transportation vision ha priorities for the next 30 years (plans are developed to generat action plans, as illustrated in thi

The final vision document, Idaho's Transportation Future: Getting There Together, is www.idahofuturetravel.info/vision.asp. Information on the Quest model is available a http://www.envisiontools.com/acloserlook.aspx.

For more information, contact Matthew E. Moore, M.A., at matthew.moore@itd.idah

Trends

The Greek philosopher Aristotle once said, "The whole is more than the sum of its parts." Aristotle's assertion can be applied to scenario planning, which depends upon understanding many different forces and trends that feed into mobility and transportation, and can affect that system. Each scenario may have a tremendous impact on the future, such as the shutdown of mines in the past that created ghost towns across areas in the West. Today, alternative fuel sources for automobiles may change the funding of road infrastructure. Economic, demographic, health, technological, and environmental factors are all important in determining future demands on the country's transportation system and its role in people's lives. Changes in demographics, safety, congestion, the environment, technology, and health and activity all produce trends.

Scenario Planning In a New York Community

The Binghamton Metropolitan Transportation Study (BMTS) is the metropolitan planning organization (MPO) in Binghamton, NY. Like many other metropolitan areas in the Northeast, Binghamton is experiencing a decline in its manufacturing-based economy, accompanied by a slow population loss. When BMTS began to update its long-range transportation plan, Executive Director Steven Gayle opted for a scenario planning approach.After hosting a

Federal Highway Administration (FHWA) scenario planning workshop, Binghamton's policy committee accepted this approach.

The plan that resulted from a scen officials in Binghamton, NY, addre community's downtown, shown he

One of the BMTS guiding planning principles is that transportation investments mus transportation system but also contribute to achieving community development goal address the question, "Where is the best place to put the growth that we know is co principle, BMTS instead asked, "What are alternative scenarios for the region's futur transportation investment to move in the right direction?"

The MPO began the process by involving the public and local officials in a communi series of interactive exercises called "Placemaking for Prosperity." Participants were certain economic sectors might occur, what they considered desirable land use patt such as young professionals or active seniors would want to live. The MPO then co level of growth over the next 25 years versus a continuation of the current trend. The applicable to similar regions, was how Binghamton can be a vibrant and successful growth. Binghamton officials expect the final plan to be adopted in September 2005.

For more information, contact Steven Gayle at sgayle@co.broome.ny.us or 607-778

Demographics. According to Alan E. Pisarski, a noted transportation researcher, the United States adds the equivalent of Canada's population to its own population every 10 years. But have we been adding the equivalent of Canada's transportation infrastructure? Not even close.

Scenario planning depends upon increased understanding of social and transportation trends, including safety. This photograph of children walking to school along a busy street clearly illustrates the need to address conflicts between pedestrians and automobiles.

Complicating the situation, current growth patterns are different than those in the

past. Today, population growth is spread across the country such that in the last decade, every State in the Nation experienced an increase. By the year 2000, more than half the country's population lived in suburbs. Half also worked outside the county in which they lived. These new growth trends must be understood on an individual basis because they may vary from one region to another.

Safety. According to a research note by the National Highway Traffic Safety Administration (NHTSA), "Motor Vehicle Traffic Crashes as a Leading Cause of Death in the United States, 2001," motor vehicle crashes are the leading cause of death among Americans from age 4 to 33. Major contributors to the death toll are alcohol, speed, and various other driver behaviors. The kinds of vehicles people drive and the roads on which they travel also contribute to crashes. In the year 2000, NHTSA estimated that motor vehicle crashes cost $230 billion, or 2.3 percent of the gross domestic product.

Congestion. The *2004 Urban Mobility Report*, published by the Texas Transportation Institute, shows traffic congestion growing across the Nation in cities of all sizes, consuming more hours of the day and affecting more travelers and shipments of goods than ever before. In 2002, congestion (based on wasted time and fuel) cost about $63.2 billion in 85 urban areas, compared to $61 billion in 2001. Up to 60 percent of unexpected traffic delays stem from what traffic engineers call "nonrecurring congestion." FHWA research shows that the causes of this type of congestion are crashes and disabled vehicles (25 percent), bad weather (15 percent), work zones (10 percent), special events (5 percent), and poor signal timing (5 percent). When roadways are congested, air quality worsens, security degrades, leisure and family activities are curtailed, service calls are less reliable and more costly, intermodal shipments are disrupted, and economic vitality is wasted due to lost productivity and wasted fuel.

To combat the growth of congestion and make travel times more reliable, FHWA is promoting and funding a number of strategies, including high-occupancy vehicle (HOV) lanes, transit improvements, traffic signal synchronization, congestion pricing on toll facilities, traveler information systems, incident management systems, dynamic message signs, improved freight connectors, public-private partnerships to finance new capacity, and much more. But travel demand continues to outpace improvements in transportation capacity.

Environment. After the publication of Rachel Carson's *Silent Spring* in 1962, Americans became increasingly concerned about protecting the natural environment. Federal, State, and local governments passed dozens of laws that improved air and water quality while protecting wildlife habitat and wetlands. Population and economic growth, however, continue to put pressure on natural resources. Americans want to continue improving air and water quality while accommodating housing, economic development, and recreational needs, and allowing mobility that is unparalleled in the world. This trend has resulted in an increased recognition by transportation agencies that protection of human, natural, and cultural resources must be a goal early in the transportation planning process.

Health and Activity. According to the Centers for Disease Control and Prevention, obesity is on the rise. The number of States with an obese adult population of more than 15 percent has increased from 4 out of 45 participating States in 1991 to 49 out of 50 States in 2002. U.S. Department of Health and Human Services testimony before Congress in 2003 indicated that nationally about 65 percent of adults and 15 percent of children and adolescents were overweight. Obesity is a major risk factor for many serious health problems, such as diabetes, hypertension, and psychosocial conditions. It also contributes to soaring health care costs in the United States, undermining the financial stability of all levels of Government as well as families and individuals. Obesity trends are important to transportation planning because investments in infrastructure may

have an impact on people's lifestyles. Changes in the built environment, such as provision of sidewalks, bicycle trails, parks, and recreational facilities, can help support the trend toward more active lifestyles and exercise.

Other Trends. Other relevant trends include public finance, global trade competition, energy consumption, and land development. All of these trends are considered drivers of social change, and they are related to a region's values, quality of life, and land use. Integrating them will lead to improved transportation planning.

Planners can communicate the importance of these trends to the broader community through scenario planning. In some cases, trying to address or mitigate one trend could affect another. By creating and evaluating various scenarios, communities can understand how the trends might interact and therefore choose options that best address the myriad issues they are facing.

The Steps in Scenario Planning

Using a variety of tools and techniques, participants in scenario planning assess trends in the key factors and bring them together in alternative future scenarios, each reflecting different trend assumptions and tradeoff preferences. As a result of the process, all stakeholders in a region-the public, business leaders, and elected officials-strive to gain consensus on a preferred scenario. This scenario becomes the long-term policy framework for the community's evolution, is used to guide decisionmaking, and can be embodied in the long-range transportation plan.

An underlying premise of scenario planning is that it is better to get the future imprecisely right than to get the future precisely wrong. Predictions of the future are never exactly correct. Rather than picking one definitive picture of the future and planning for that future, scenario planning enables stakeholders in a region to consider various possibilities and identify policies that can adapt to changing circumstances. Scenarios do not describe a forecasted end state but rather are stories about future conditions that convey a range of possible outcomes.

People are notoriously reluctant to accept change. They resist increased development, increased traffic, limits on land use, limits on their mobility, and loss of open space. But the United States continues to grow, and growth brings positive as well as negative impacts on the lives of Americans. There are tradeoffs. Scenario planning can help people understand the forces of change and the collective choices they have.

Highway congestion like this is one trend evaluated in scenario planning processes.

For many, the first step is to identify the quality of life values that are important to the region. This information provides the foundation for scenario development. These issues can be expressed as questions about the future that the scenarios might answer. Planners, working in close coordination with community leaders, businesses, local officials, the public, and other stakeholders, could undertake the following additional six steps.

Step 1: Research the driving forces. Define the major sources of change that affect the future, whether those forces are predictable or not. Some of the relatively predictable elements are local demographics, trends in local land use, levels of congestion, and mode split. Less predictable are macro elements such as the global economy, future availability of funding for infrastructure, global environmental conditions, and technological innovation. Many other driving forces are uncertain, but narrowing them down will help advance a scenario planning process.

Step 2: Determine patterns of interaction. Consider how the driving forces could combine to determine future conditions. To etermine these patterns of interaction between driving forces, planners can develop a matrix that identifies the driving forces as a pair of opposites with a potential positive or negative outcome. For example, if the economy is a driving force, it can be labeled as having either no growth or fast growth. By determining the interaction of each driving force, scenarios can be created.

As part of a scenario planning process, the Delaware Valley Regional Planning Commission, the MPO for the Greater Philadelphia-Camden-Trenton region of Pennsylvania and New Jersey, developed a matrix that categorized various transportation impact assessments and relevant policy concerns that affect long-range planning. To determine patterns of interaction, the MPO assessed scenarios against future spatial characteristics of the region, future mobility and accessibility needs, and potential congestion locations, and then quantified delay costs. The matrix enabled the MPO to understand the interactions and devise five scenarios to present for public review, along with policy support measures for each scenario. The results of this process served as a foundation for the region's 2030 transportation planning process.

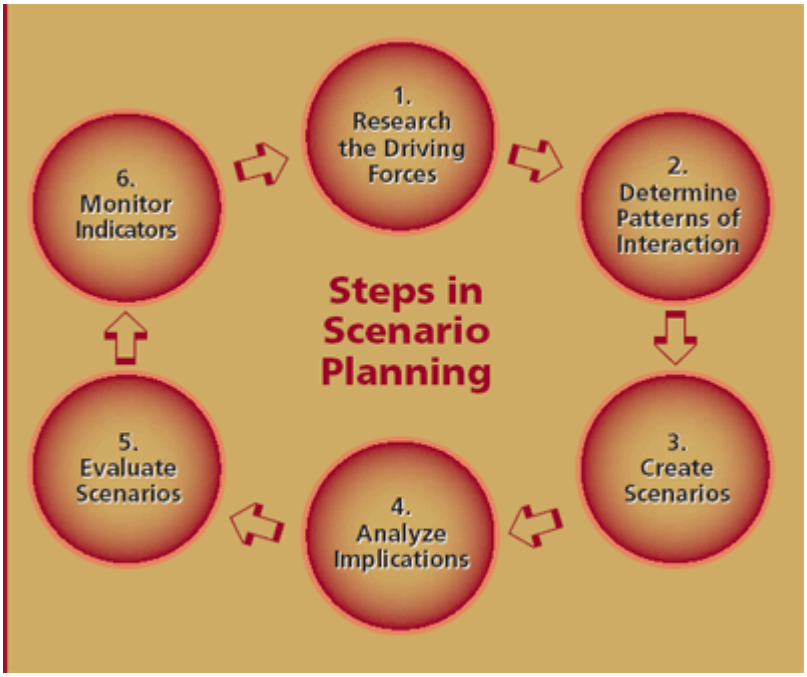
Step 3: Create scenarios. When generating scenarios, planners should think through the implications of different strategies in different future environments. The goal is to bring life to the scenarios so that community stakeholders can easily recognize and connect the various components. Planners creating stories based on the interaction of driving forces and how those drivers affect local factors might develop scenarios that challenge existing thought patterns.

Step 4: Analyze the implications. Ultimately, scenario planning is a technique for improving decisionmaking, not only about transportation but also about land use, public investment, and environmental policies. The scenarios enable planners to explore the shape and nature of transportation in a variety of circumstances, using a range of tools. They can present scenarios visually by employing various software tools, such as geographic information systems. The use of visual information to show the interactions in each scenario can help the public and decisionmakers understand the consequences of potential actions and the potential impacts of various scenarios.

Step 5: Evaluate scenarios. Planners can measure the scenarios against one another by comparing indicators relating to land use, transportation, demographics, environment, economics, technology, and other driving forces. During large regional public meetings, graphic simulations of alternative

scenarios can stimulate understanding and decisionmaking among stakeholders. Through this process, the community can formulate reasoned responses and enhance its ability to respond to change.

Step 6: Monitor indicators. Scenario planning is an ongoing process. As the future unfolds, planners need to assess and compare real growth patterns to the selected scenarios and devise new scenarios, make new decisions, or create policies to address changing conditions.



Federal Initiatives

FHWA offers technical support, fund planning, information, and research to State, regional, and local partners as they undertake scenario planning. Recent FHWA efforts include the following:

- Scenario planning in California, Illinois, Michigan, Missouri, Utah, Virginia, and Wisconsin funded by FHWA
- A national peer roundtable for policymakers, community leaders, and technical experts to discuss the keys to effective support for scenario planning-concluding with a report on the roundtable, Scenario Planning: *A Framework for Developing a Shared Vision for the Future* (FHWA-HEP-04-027)
- Peer workshops hosted and funded by FHWA division offices to discuss benefits, strategies, and examples of scenario planning for transportation decisionmaking
- Coordination or participation in national conferences and meetings discussing the benefits and uses of scenario planning
- In fiscal year 2004, more than $500 million in transportation planning funds for States and MPOs, funds that can be used to support scenario planning
- A 2005 launch of a Web site dedicated to scenario planning best practices and research Scenario planning enhances traditional transportation planning by recognizing uncertainty, focusing on major forces or drivers that have the potential to affect the future, and by educating and involving the public. By developing scenarios that tell alternative stories of the future, planners and the public are better able to recognize the interaction between these forces and determine those

planning activities that can be implemented today and those that will be available for future adoption. The intent of scenario planning is not to replace traditional planning practices. Instead, it is a process that can be applied to recognize the range of outcomes in the future, which then can be fed into the traditional transportation planning process. The process also enables planners and decisionmakers to consider system performance in the context of other relationships in the community and to use the latest software tools to analyze and visualize alternative futures.

"Planning is bringing the future into the present so that you can do something about it now," said time management guru Alan Lakein.

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For more information about FHWA's scenario planning initiative, go to http://www.fhwa.dot.gov/planning/scenplan/index.htm.

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