Embracing Uncertainty in Regional Transportation Planning: A Transit District Case Study

Submission date: August 1, 2011 (revised November 14, 2011)

Word count: 5,975

Figure count: 2

Table count: 1

Corresponding author:

Kristin Hull
Senior Project Manager, CH2M HILL
2020 SW 4th Avenue, Suite 300
Portland, Oregon 97201
503-736-4160
503-223-1494 (fax)
kristin.hull@ch2m.com

Other authors:

Sam Seskin
Transportation Planning Director, CH2M HILL
2020 SW 4th Avenue, Suite 300
Portland, Oregon 97201
503-736-4019
503-223-1494 (fax)
sam.seskin@ch2m.com

Tom Schwetz
Director of Planning and Development, Lane Transit District
PO Box 7070
Eugene, OR 97401
541-682-6203
541-682-6111 (fax)
Tom.Schwetz@ltd.org

ABSTRACT

This paper focuses on how the practice of scenario planning for transportation can be adapted under certain circumstances to acknowledge the uncertainty facing transportation agencies in the form of external forces, trends, and threats. Using this new focus, planners can develop multiple plausible scenarios and focus on monitoring how the future unfolds rather than choosing a preferred future that will likely be rendered obsolete by factors outside the agency's control.

The scenario planning process outlined in this paper was used by the State of Oregon's Lane Transit District to develop a long-range transit plan. The scenario planning method described in this paper effectively responds to weaknesses in current practice, including a focus on a single, preferred scenario, reliance on a single population and employment forecast, and a routine failure to monitor trends over time.

INTRODUCTION

Long-range planning conducted by transportation agencies typically relies on official estimates of population and employment growth, as well as the assumed growth patterns of currently adopted comprehensive plans. In addition, planners incorporate assumptions related to the cost of travel, the nature of travel markets, and other local conditions and constraints. Collectively, these estimates and assumptions constitute an "official future" upon which long-range plans are developed. While necessary, this approach leads to a focus on single-point estimates which often constrain or short-circuit consideration of the uncertainties prevalent in any long-range planning process.

Scenario planning is one way to overcome this reliance on the official future. Scenario planning, the practice of looking at various futures, is widely practiced in the United States, and is frequently integrated into transportation planning processes at the local, metropolitan, and state levels. The U.S. Federal Highway Administration (FHWA) offers a website (http://www.fhwa.dot.gov/planning/scenplan/index.htm) that provides best practice transportation planning applications including a guidebook, training materials, reports from peer workshops, a "New Trends" report, and the following definition of scenario planning:

> Scenario planning is an analytical tool that can help transportation professionals prepare for what lies ahead. Scenario planning provides a framework for developing a shared vision for the future by analyzing various forces (e.g., health, transportation, economic, environmental, land use, etc.) that affect growth. Scenario planning, which can be done at the statewide level or for metropolitan regions, tests various future alternatives that meet state and community needs. A defining characteristic of successful public sector scenario planning is that it actively involves the public, the business community, and elected officials on a broad scale, educating them about growth trends and trade-offs, and incorporating their values and feed back into future plans (*1*).

Reports on the FHWA Web site and research by Bartholomew and others (*2, 3*) suggest that scenario planning is an active part of the planning practice, particularly as it relates to metropolitan land use planning. Bartholomew's 2004 survey of 152 metropolitan planning organizations indicated that 45 percent were engaged in some type of scenario planning activity (*2*). In 2003, FHWA and FTA hosted a peer exchange on applications of scenario planning. The report identifies many of the same uncertainties examined in our case: demographics, health and activity, land use, freight and financial capacity, but, in the end, the process examined results in a preferred future scenario rather than an acceptance of uncertainty (*4*).

Given that good news, what can we learn from the first 20 years of transportation-land use scenario planning? FHWA's Guidebook suggests that scenario planning should have six phases, familiar to practicing planners and illustrated by Figure 1: (1) scope the problem, (2) establish the baseline, (3) establish goals or aspirations, (4) create alternative scenarios, (5) assess the impacts and affects of each scenario, and (6) craft the vision. The published literature and numerous case studies available on the Web site conform to this process to varying degrees. However, we contend that in the conduct of steps 4 and 6, in particular, current practice has weaknesses that reduce the usefulness of the resulting plans and the prospects for their implementation. These weaknesses include:

- A focus on a single, preferred scenario, and thus an underestimation or failure to acknowledge uncertainty

- Limited or infrequent accounting for a rich variety of external forces, trends, and threats
- Reliance on a single forecast of population and employment
- Routine failure to monitor over time the extent to which trends conform to the preferred scenario

This paper offers an approach to addressing these weaknesses and a case study of its application. With this new focus, planners can develop multiple plausible scenarios and focus on monitoring how the future unfolds rather than choosing a preferred future that will likely be rendered obsolete because of factors outside the agency's referenced point-of-view.

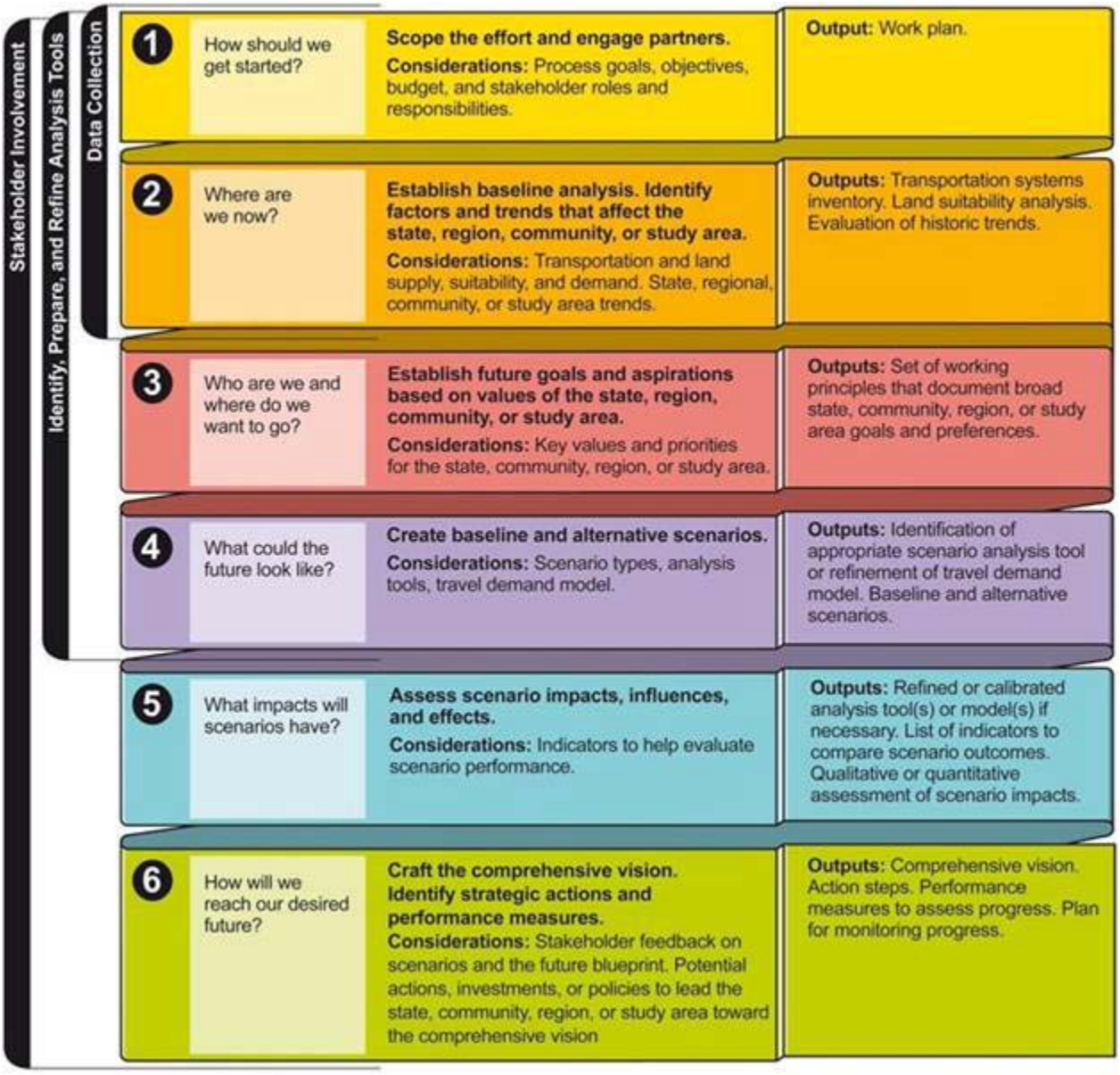

FIGURE 1 FHWA six-phase scenario planning framework (source: *1*)

CHARACTERISTICS OF SCENARIO PLANNING

While uncertainty is widely acknowledged in public agency planning, structured consideration of uncertainty and the implications and options that follow is rare, and is typically focused on only a few variables. As a result, there is no formal assessment of the different ways that key uncertainties might play out or interact. Harvard Business School researchers Anthony Mayo and Nitin Nohria note in their recent book *In Their Time* (*5*) that a defining characteristic of the greatest leaders in the twentieth century was a quality they termed "contextual intelligence"– the "profound sensitivity to macro-level contextual factors in the creation, growth, or transformation of businesses." They describe this as a "sensing capability" or an understanding of "how to make sense of one's time and to seize the opportunities it presents."

Developing this ability to assess uncertainty systematically, sense opportunities, and avoid threats is at the heart of the scenario development process. Scenario planning is a tool to seed thinking about the diverse possibilities the future holds, and thus to challenge the assumptions embedded in "official" futures. Outcomes of the process include a more robust set of options that give an organization an opportunity to "rehearse the future."

The Global Business Network (GBN), a firm that provided scenario planning services and training in conducting scenario planning, provides the following concise summary of scenario planning's purpose:

> The purpose of scenario thinking is not to identify the most likely future, but to create a map of uncertainty – to acknowledge and examine the visible and hidden forces that are driving us toward the unknown future. They are designed to stretch our thinking about emerging changes and the opportunities and threats that the future might hold. They allow us to weigh our choices more carefully when making short-term and long-term strategic decisions (*6*).

In his book *The Art of the Long View*, Peter Schwartz outlines the origins of scenario planning (*7*). He notes that scenario planning was originally used for military planning following World War II. In the early 1970s, planners at Royal Dutch/Shell, looking for better ways to prepare managers for possible changes in the price of oil, established and perfected the methodology used today. Using the new approach, Shell was the first to see the emerging overcapacity in the petroleum industry, and thus was better prepared to deal with the ensuing drop in demand and was consistently able to forecast oil-price changes better than its competitors.

Since then, companies in other industries have used scenario planning for providing input to strategic planning, improving investment decision-making, and guiding thinking about competitive moves. Specific applications include a regulated monopoly's preparation for a more free-market-oriented existence in an increasingly integrated Europe, and the Los Angeles Department of Water and Power's investigation of future residential water use. However, transportation planning often overlooks the range of uncertainties found in robust scenario planning and, as a result, has missed the opportunity to plan for multiple futures simultaneously without pretending to know which future will be realized. Scenario planning is a tool to begin thinking about the diverse possibilities the future might hold, and to challenge the assumptions embedded in the "official future."

The scenario planning process used in this case is loosely based on the process developed by GBN. The process used in this case has five stages is shown in Figure 2 and described in more detail below.

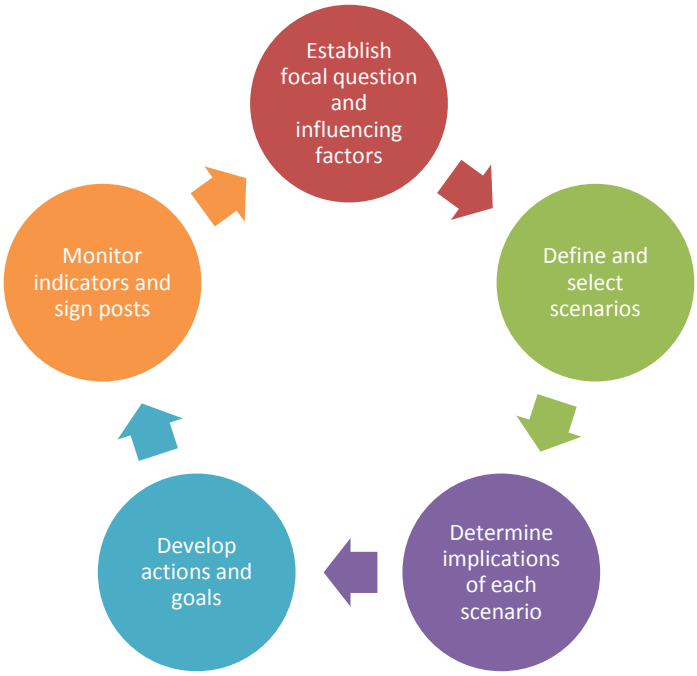

FIGURE 2 Steps to developing scenarios

Step 1: Establish the focal question and influencing factors

The purpose of this task is to identify the precise strategic problem that stakeholders are attempting to understand through the scenario process. This is best accomplished by asking both broad and narrow questions, and working toward one sufficient in scope to be useful in guiding the organization's decisions during the agreed-upon planning horizon.

An ideal focal question is large enough to encompass a broad range of relevant variables, but narrow enough to give decision makers opportunities to react. A focal question can be oriented to a key decision, strategic direction, or a need to learn about implications of possible futures on the viability of the organization.

Once the focal question is developed, the influencing factors – both the driving forces which are sources of future change and the critical uncertainties are both highly uncertain and highly influential are developed. Driving forces are the external factors that shape the course of future events and history. Identifying these forces dramatically enhances the ability to imagine future scenarios. These factors often include social, technological, economic, environmental, and political components. Some driving forces are relatively predetermined; other forces are uncertain.

The purpose of considering driving forces is to identify those forces that, in the context of the organization, are highly uncertain and may have the potential to tip the future in one direction or another (thus affecting the organization's ability to realize its vision). These are the critical uncertainties that have two essential characteristics – unusually high impact, and unusually high uncertainty or volatility. The art of creating the scenario stories (step 2) lies in capturing the full set of critical uncertainties in a robust way that allows observers to "see" their particular uncertainty explicitly.

Step 2: Define and select scenarios

After identifying the focal question, the process for establishing an effective scenario framework, or the paring of two uncertainties, is likely the most important element of the overall process. GBN identifies the following criteria for a good scenario framework. The framework should be:

- Challenging
- Plausible
- Relevant
- Divergent

Scenario frameworks are composed of two axes with critical uncertainties on each. Each end of a given axis is one extreme of the uncertainty. The axes could simply be defined as more or less, new or old, or could be defined more specifically for the uncertainty in play. Once the axes are labeled, the uncertainties can be paired and stories emerge.

The paired uncertainties form the frameworks from which the larger narrative can be created. Developing a story adds greater depth to the scenarios by drawing out those elements that made the scenarios useful for strategic planning.

Step 3: Determine implications

The next task in the scenario development process is identifying implications based on the scenario stories. GBN defines implications as "the conditions under which you will need to operate," and options as "the range of actions you will take in light of the conditions.(*6*)"

Implications can include:

- Challenges
- Bottlenecks
- Shortages
- Emergent needs
- Emergent capabilities

In this process, the uncertainties are not weighted in determining implications. Instead the uncertainties are used to develop plausible stories and those stories are used to develop order-of-magnitude variations in critical factors that affect outcomes.

Step 4: Develop actions and goals

Based on these options, the plan should consider prioritize actions or investments based on when action needs to be taken and the risk associated with the action. Near-term actions or investments should receive higher priority than those to be made down the road, and low-risk investments may be given priority over higher-risk options. Because so many actions that affect a transportation agency are actually taken by others, the agency's actions can also include the development of goals that shape partners' policies and actions.

Step 5: Monitor indicators and sign posts

After the implications and options have been established, the final step is to monitor events as they unfold to provide a focused understanding of how the future is playing out in ways that are of importance to the agency.

Extra-regional indicators and signposts should be monitored through popular press, scholarly journal articles, or other observation. It is best to use multiple media forms when looking for trends or indicators of future developments, since early indicators could come from

unexpected locations. Local or regional indicators may come from more familiar or conventional sources of social, economic, and transportation data used in current planning practices.

CASE STUDY: LANE TRANSIT DISTRICT LONG-RANGE PLAN

The Lane Transit District (LTD) provides fixed-route, paratransit service and commute trip reduction programming for the approximately quarter-million people in the Eugene-Springfield, Oregon region. Each day, approximately 43,000 riders use LTD's 33 regular bus lines and 1 bus rapid transit line called the Emerald Express (EmX). As LTD plans for its future, it faces uncertainties, from energy prices to land use policy and federal funding, that it can neither control nor predict. Because of this uncertainty, LTD chose to use a scenario planning process to develop a long-range plan that includes robust scenarios and short- and long-term actions that would serve the agency in a variety of futures. This approach is in contrast to the typical method to developing a long-range transit plan that focuses on forecasting future ridership and developing a route plan for serving those riders.

Establish the focal question and influencing factors

The planning process began by developing a focal question that framed scenario development. The focal question for LTD's long-range plan was:

> How might service costs, funding levels, public policy, and community support play out in ways that affect LTDs ability to provide effective and efficient transportation services to meet community needs over the next 20 to 30 years?

Working from the focal question, the scenario planning team defined the influencing factors by first looking at the driving forces in the form of global and local stressors facing LTD:

Energy stress

The price of gasoline has risen dramatically since the early 1990s and is projected to continue to rise. According to the U.S. Energy Information Administration, the average price per gallon of gasoline is anticipated to rise to over $6 in 2035 (*9*). Rising gasoline prices may increase the cost of single-occupant vehicle trips and similarly create an increased need for transit. At the same time, the increase price may lead to the use of more fuel-efficient vehicles and alternative fuels that may maintain vehicle operating costs at near-current levels. Rising oil prices would result in higher diesel prices for LTD. Increased diesel prices could require service reductions or could drive LTD to new, as-yet-undefined technologies.

Climate stress

Throughout the political and policy landscape, increasing concerns over a changing climate resulting from greenhouse gas emissions are likely to drive new policy initiatives. These policies are likely to emphasize transit service in place of single-occupant vehicle travel and may encourage the use of new, lower-carbon fuels to operate transit fleets. A rapidly changing climate may also increase the rate of migration, with more people choosing the relatively temperate climate and plentiful water of the Willamette Valley instead of the warmer, drier climate of the southwestern U.S. Together, these stresses, like others, will affect demand, supply, and cost of transit services

Economic and fiscal stress

Experts anticipate more rapid economic changes in the future than have occurred in the past. Lane County's economy has evolved away from timber and agriculture and its future may depend on manufacturing and services whose character is difficult to predict. At the same time, the rising federal debt may put fiscal pressure on the federal government to reduce discretionary spending which could result in reduced funding for local transit agencies. According to the U.S. Congressional Budget Office, the federal fiscal outlook is daunting; rising costs for health care and social security will tax domestic programs significantly and will lead to much less funding for domestic discretionary items such as transportation (*10*).

Population stress

The population in LTD's service area will continue to grow. The region is strongly associated with the University of Oregon. But how university will grow or evolve is unknown. At the same time, young people are increasingly making decisions about life styles such as eschewing car ownership for a lifestyle focused on biking, walking, and transit use. A 2008 *New York Times* article reported that the number of 16-year-olds with driver's licenses dropped from nearly half in 1998 to less than one-third in 2006 *(11*).

In addition, the proportion of older adults in Lane County may increase as life expectancies increase and the baby boom generation ages. According to the U.S. Department of Health and Human Services, the proportion of the population aged 65 and over was 12.4 percent in 2000 and is expected to be just less than 20 percent by 2030 (*12*). The proportion of the population aged 80 and over is expected to grow even faster (*12)*. Aging adults tend to limit their driving and can experience less mobility overall. These demographic shifts could change the demands placed on LTD by the young and the aged.

Define and select scenarios

Beginning with these stressors, the scenario planning team developed a list of uncertainties likely to affect LTD's future including new demands for mobility service, land use patterns, federal funding for transit, and local transportation policy. From this broad list of uncertainties, the team selected two critical uncertainties: mobility markets and adaptive capacity to frame the development of scenarios.

Mobility markets refers to travel preferences of Eugene-Springfield residents by examining demographics, the state of the economy, and social attitudes around transportation. The range of possible mobility markets was defined by the endpoints of traditional and new. In this dichotomy, traditional mobility markets favor single-occupant autos while new mobility markets favor other existing and emerging mobility options such as transit, car sharing, teleworking, cycling, and walking.

Adaptive capacity refers to the ability of the Eugene-Springfield region to adapt to changing conditions. In particular, this uncertainty examines the ability of the public sector to adapt as the economy, demographics, and the environment change. Low adaptive capacity would be defined by a public sector that is unable to change to meet new demands and is in a constant state of triage. High adaptive capacity is defined by a dynamic public sector where agencies work collaboratively to solve problems, business and institutional sectors are active participants in problem solving, and community members trust and support those agencies.

To envision the scenarios more fully, the team developed each one in narrative fashion. These "stories" described in more detail climate refugees, economic recessions, emergence of new technology, demographic shifts, catastrophic climate change, new federal policies, and other events that could dramatically shape the divergent futures. While the details of the story were speculative, the act of adding the narrative to the scenario framework created rich detail from which to extract the implications of each future for the regional transit system and LTD.

Implications: the scenarios applied to the agency's bottom line

Using the scenario planning approach, the team considered the implications of these scenarios for the transit agency's long-term future using a spreadsheet model that forecast ridership, operating costs, and funding for each scenario. This model considered how the factors that affect transit demand (e.g., population, employment, and land use patterns), the cost of operating transit service (e.g., labor and fuel costs), and the availability of revenue for operating and capital costs would vary for each scenario. For this exercise, weights or precise changes were not developed. Order-of-magnitude changes were assumed based on the attributes of the scenario. The general results of this exercise are show in Table 1.

269

TABLE 1 Ridership and cost implications of scenarios

	Low Adaptive Capacity / Traditional Mobility Market	Low Adaptive Capacity / New Mobility Market	High Adaptive Capacity / Traditional Mobility Market	High Adaptive Capacity / New Mobility Market
Ridership	35 million	17 million	17 million	30 million
Operating costs	$170 million	$100 million	$90 million	$100 million
Revenues	$127 million	$83 million	$122 million	$163 million

270 Notes: (1) For this exercise, operating costs are a function of fuel costs and labor costs; revenues are a function of
271 payroll tax, fares, and capital grants. (2) LTD operates with a balanced budget. These figures represent estimates of
272 costs and revenues based on each scenario and indicate the magnitude of budget adjustment that would be needed to
273 balance costs and revenues.

274 The results in Table 1 may not seem intuitive. For example, the findings related to
275 ridership were based on assumptions about the change in population, jobs and urban form under
276 each scenario. The ideas underpinning these assumptions were intentionally broad with factors
277 like rapid migration due to climate change, increases in teleworking due to technological
278 advances, and different density patterns based both on the rate of growth and local policies all
279 influencing ridership numbers. Because the scenario names focus only on the axis endpoints, it
280 may be difficult to intuit how these other factors influenced ridership, costs and revenues.

281 From this analysis, the scenario planning team drew conclusions about how changing
282 mobility markets and varying levels of adaptive capacity by LTD and its regional partners could
283 affect LTD's future. These lessons were boiled down to three themes that underpin transit
284 agency operations: ridership, energy costs, and funding.

285 *Ridership*
286 Transit ridership is generally predicted based on population, employment, and urban form. From
287 the scenarios, it is apparent that population growth will lead to increased transit ridership, but
288 how that population growth occurs, where people live, where jobs are located, and the nature of
289 employment affect how LTD can serve that demand. The key learning from the scenarios was
290 about the rate of population and job growth and the urban form that organizes new housing and
291 new employment.

292 *Funding*
293 The ability to provide high-quality transit service is dependent on the availability of funding
294 from payroll taxes, farebox revenues, and other funding sources. The funding gap is related both
295 to changes in mobility markets – how much demand changes and how much of this new market
296 LTD captures – and adaptive capacity. Adaptive capacity would consider how well the region
297 works together to find new ways to fund transportation related services, how well the region
298 adapts to a changing economy, and how land use shapes transit efficiency.

299 *Energy costs*

Increasing fuel cost is a key global stressor affects both demand for service and the cost of providing service. In terms of demand for service, rising fuel costs for households can create new mobility markets including increased demand for transit service or other new shared transportation services because of the relative cost of driving. This change in cost can affect decision making at the household level, but as LTD experienced in 2008, the collective impact of this new demand affects agency operations.

Actions and goals

The evaluation of the four scenarios formed the basis for developing strategic actions for LTD. Some of these actions are "good bets" because they will make sense for LTD no matter what the future. Knowing when or if to implement others will require careful monitoring of the future as it unfolds. Some of the actions include the following:

Develop transit-supportive land use policy

Land use policy that encourages a dense urban form and employment in nodes can support efficient provision of transit service, thus both increasing demand and decreasing the cost of serving riders. With any scenario, LTD will continue to provide transit service. While LTD cannot control the rate at which population grows, setting policies that define the urban form will keep transit efficient and relevant in any future.

In addition, LTD could work with local governments to encourage compact land use patterns that support the concentration of jobs and housing in walkable nodes through land use plans, and focus transportation investments in facilities for walking and biking near transit stops. LTD could consider establishing a transit-oriented development program to support cities and private developers to create transit-oriented development along EmX routes. In other areas, activities could range from technical support for developers and cities to financial contributions that increase densities and improve design.

Establish primary transit and high capacity transit networks

Again, assuming that LTD continues to provide fixed-route transit service under any scenario, LTD should work with local governments to determine a primary transit network, or a series of routes where LTD will provide high quality service, and coordinate those routes with intense land uses.

Because of the size of the capital investment required for EmX, a long-range EmX system plan should be developed by LTD in cooperation with local governments and other stakeholders under any future. This plan will ensure that EmX investments match local visions about where the region's activity centers will be and should establish targets that local governments should work toward in advance of EmX service being provided.

Build adaptive capacity

Building adaptive capacity is also a good bet for LTD and the region regardless of the way revenues change. Focusing effort on deepening the collaborative working relationships among government agencies and between the government sector and private and institutional sectors will help LTD proactively respond to a changing world. This will help LTD when seeking new funding sources when necessary and adapting service provision to more efficiently serve transit needs. This kind of collaboration also allows LTD to influence other policy decisions that could emerge.

Become a mobility service agency

If signposts indicate demands for new mobility services, LTD should transition from a public transit agency to a mobility service organization. The model is already in place with LTD providing commute reduction programs for the region, and being a customer-focused, regional service provider. As a mobility service agency, LTD would be able to respond to demands for new kinds of mobility like bike and car sharing.

Track emerging vehicle technologies
While diesel and diesel hybrid buses are currently the leading fleet technology, LTD should watch for signposts signaling when adapting to a new technology makes environmental, policy, and financial sense.

Develop strategies for managing costs and diversifying revenue sources
While LTD is likely to continue to receive primary operating funding from payroll taxes, diversifying revenue sources makes sense in any future given the likelihood of more frequent economic cycles. To build community support for this strategy, changes in revenue sources will need to be made in conjunction with an aggressive cost management. The strategic question that emerges for LTD is "what is the long-term sustainable level of service that can be provided to the community based on?" Depending on how the future unfolds, ways in which LTD might diversify its revenues include expanding advertising, or expanding offerings with new services that produce revenue such as car or bike sharing. For capital improvements, LTD should closely monitor federal policy and program changes and consider local funding when projects are not a good match for federal sources.

The long-range plan also included goals that suggest actions by others as many aspects of LTD's operations are intertwined with local and regional government actions.

Indicators and signposts
Developing and tracking indicators and signposts is an ongoing effort for LTD. To be successful, LTD should monitor both how mobility markets are changing and how well the region is able to adapt. This monitoring must be open, constructive, and regular. LTD currently has numerous performance measures. Once the plan is adopted, the agency will revise these with the twin focuses of mobility markets and adaptive capacity in mind. Indicators of change in mobility markets may include travel costs, reliability, ease of modes of travel, development patterns, changes in mobility related technologies, and the lifestyle choices of different generations. Indicators of change in adaptive capacity could include the region's maintenance of federally required plans, consistency between local transportation plans and LTD goals, collaboration among elected officials at the regional level, and the level and flexibility of local and federal funding.

Developing the plan
After completing the five step scenario process, the team produced a short summary of the scenario development process that will serve as the long-range plan. The report provides a review of the external forces and stressors that will affect how LTD provides service in the future, the lessons learned from testing the scenarios, short-term actions for LTD to consider, and the goals and objectives that can inform long-range LTD decision making as well as local and regional transportation and land use policy. This approach makes sense for LTD because much of LTD's long-term decision making is in collaboration with local and regional governments. The goals and objectives developed will provide guidance for transit policies in local and regional plans while allowing flexibility for those policies to fit the local jurisdiction. For other applications, the scenario planning effort might result in specific strategies or policy objectives.

CONCLUSIONS: LESSONS LEARNED AND TRANSFERABILITY

The scenario planning approach to developing a long-range plan is a new paradigm for a transit agency. It represents an acknowledgment of the things planners and policy makers know and the things they cannot know, and of the things the agency cannot control. LTD has spurred a

conversation about the future of transit in the region and redefined the question from one of "where will buses go?" to one about the future mobility needs of LTD's customers and how LTD can serve those needs. We assert that this kind of scenario thinking produces better long-range plans because it provides a framework for future decision making rather than defining decisions today for an unknown future.

The project team learned the following lessons that can inform future applications of this technique to long-range transportation plans.

Lesson 1: Focus external communications on the questions at hand rather than the process

Scenario planning is a useful framework, but one that requires careful adaptation to public sector circumstances. In the context of strategic planning in a corporate boardroom, the audience is small and well informed. In the context of a public agency, decision makers and the public-at-large may not understand the details or context of scenario development. For this reason, scenario planning should be seen as a means to end rather than an end in itself. Agencies should resist the temptation to explain the details of the process to stakeholders and officials. Instead, it may be more useful for agencies to explain outcomes and lessons at the conclusion of the process.

However, this does not mean that scenario planning processes bar meaningful stakeholder involvement. Rather, it means that scenario planners must ask carefully crafted questions that gather the necessary input without requiring all participants to understand the process. Stakeholder and official input is necessary to understanding the focal question, driving factors and critical uncertainties (steps 1-3). Input at later stages should occur after step 6 (the plan that emerges).

Lesson 2: Build expectations about the outcomes

Scenario planning is focused on strategy development rather than typical outcomes of long-range plans such as route maps and service levels. The lack of tangible products can be frustrating to planners who are looking for the certainty of project lists and capital improvement plans. To counteract this, scenario planners should characterize their plans as strategic and use those strategic plans to inform the development of the needed tangible products. In the context of scenario planning, the tangible products may have a slightly different focus with different outcomes based on uncertainty. However, communicating what to expect from the long-range plan prepares the consumers of the results for what the long-range plan will – and won't – provide.

Lesson 3: Watch the way you use your numbers

By its nature, scenario planning challenges assumptions about the official future by looking at divergent and challenging future worlds. This is an important part of moving away from a single point forecast that relies on assumptions about key factors that are beyond the agency's control. When those uncertain factors are defined based on the scenario framework and the variation is captured in numbers – population, employment, tax revenue, and transit ridership – care must be taken to describe the purpose and potential implications of those rough estimates. The purpose of understanding the implications of the scenarios is to inform policies and actions, not to precisely predict these changes as in a detailed modeling process.

It is critical to the value of the scenario process that a wide range of factors be monitored. While the scenario development framework is based on two of the most critical uncertainties, a broad set of uncertainties are at play as the future unfolds. Tracking this wide spectrum of factors

and assessing their implications individually and their interplay, is one of the most important tasks in the scenario planning process.

Lesson 4: Refresh the conversation

To the extent that the future remains uncertain, this process is ongoing. Change will bring a need to ”refresh” the strategic conversation. Monitoring efforts may indicate that new patterns of uncertainty have arisen, thus requiring an update or revision to existing plans and strategies. A new strategic initiative or other significant change in the organization would also trigger an update.

Transferability

While this approach to long-range planning can be applied to any long-range transportation plan, key questions an agency might ask before deciding to employ scenario planning to support the development of a transportation plan include the following.

How much will external factors influence our transportation future?

It is difficult to imagine a long-range transportation plan without significant uncertainty as transportation planning is fundamentally influenced by the economy, demographics, technology, policy, and other difficult to predict forces. It is equally difficult to imagine a transportation agency that functions in a world where external factors do not have influence. Most agencies receive funding and policy directives from others, are reliant on partnerships with other agencies, and are subject to voter approval for funding or to select leaders.

Do senior managers and decision makers see the benefit of looking at different futures?

Adopting a new paradigm for planning, particularly one that moves away from certainty, requires leaders who understand the value in this approach and who are willing to support the process. Having organizational support for simultaneously preparing for divergent futures is critical to a successful process.

Does the agency have the time and budget to adequately consider various futures and still meet any regulatory or policy requirements for the long-range plan?

Many long-range planning processes are driven by state or local regulations that stipulate outcomes. In many cases, this requires planners to develop an official future and corresponding project list. If an agency decides to undertake a scenario planning process in conjunction with this kind of long-range plan, the agency needs to ensure that it can afford – in time, money, and political support – the development of different futures.

Can the agency monitor the future and revisit strategy regularly?

Scenario planning only makes sense if the agency has the capacity to monitor the future as it unfolds and change its strategy regularly. If not, a plan based on uncertain future scenarios has limited benefit.

Conclusions

The scenario planning method described in this paper effectively responds to weaknesses in current practice, which include a focus on a preferred scenario, limited accounting for external forces, reliance on a single population and employment forecast, and a routine failure to monitor trends over time in important strategic factors. This approach has been proven in other contexts to lead to nimble, flexible plans grounded in the uncertainty of continuously changing regional, national and even global conditions.

In that context, Peter Schwartz offers the following insight from his decades of experience practicing scenario planning:

> …if there is one thing I have learned repeatedly in the past 20-plus years, it is this: The world may be uncertain and unpredictable but that's no excuse for being unprepared. We have more access than ever to the data, knowledge, ideas, and tools that we need to shape a better future for us all (*13*).

REFERENCES

1. Federal Highway Administration. *New Trends in Transportation and Land Use Scenario Planning*. http://www.fhwa.dot.gov/planning/scenplan/ngscenplanrpt.htm, Accessed July 20, 2011.

2. Bartholomew, K. *Integrating Land Use Issues into Transportation Planning: Scenario Planning*. Federal Highway Administration Cooperative Agreement No. DTFH61-03-H-00134, 2005.

3. Bartholomew, K., R. Ewing. Land Use-Transportation Scenarios and Future Vehicle Travel and Land Consumption. *Journal of the American Planning Association*, Vol. 75, No. 1, 2008, pp. 1-15.

4. Federal Highway Administration. *Scenario Planning: A Framework for Developing a Shared Vision for the Future*. http://transportation.ky.gov/Congestion-Toolbox/Documents/Scenario%20Planning%20Brochure.pdf, Accessed November 14, 2011.

5. Mayo, A. J., and N. Nohria. *In Their Time.* Harvard Business School Publishing Corporation, Boston, 2005.

6. Global Business Network. Why Scenarios? http://www.gbn.com/about/scenario_planning.php. Accessed July 31, 2011.

7. Schwartz, P. *The Art of the Long View.* Bantam Doubleday Dell Publishing Group, Inc., New York, 1996.

8. Ogilvy, Jay and Erik Smith. Mapping Public and Private Scenario Planning: Lessons from regional projects. *Development*, 2004, pp. 67-72.

9. U.S. Energy Information Administration (EIA). *Annual Energy Outlook Reference table A3: Energy Prices by Sector and Source,* EIA Annual Energy Outlook 2011, April 26, 2011. http://www.eia.gov/analysis/projection-data.cfm#annualproj. Accessed July 22, 2011.

10. U.S. Congressional Budget Office. *The Long-Term Budget Outlook, June 2010*. http://www.cbo.gov/doc.cfm?index=11579. Accessed May 15, 2011,

11. Chapman, M., and M. Maynard. Fewer young Americans drive cars at 16. *New York Times, December 5, 2008.* http://www.nytimes.com/2008/02/25/business/worldbusiness/25iht-drive.1.10352210.html. Accessed May 15, 2011.

12. U.S. Department of Health and Human Services. Public Health and Aging: Trends in Aging -- United States and Worldwide, *Morbidity and Mortality Weekly Report*, Vol 52, No. 6, February 14, 2003, pp. 101-106. ,: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5206a2.htm. Accessed May 15, 2011

13. Schwartz, Peter. *Learnings from the Long View.* Global Business Network, 2011, p. 62.