FHWA Scenario Planning Guidebook

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Notice

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Executive Summary

The purpose of this guidebook is to assist transportation agencies with carrying out a scenario planning process from start to finish. Transportation agencies can use the guidebook as a framework to develop a scenario planning approach tailored to their needs.

The guidebook presents the six key phases that agencies are likely to encounter when implementing the scenario planning process:

- **Phase 1: How Should We Get Started?** Scope the effort and engage partners.
- **Phase 2: Where Are We Now?** Establish a baseline analysis. Identify factors and trends that affect the state, region, community, or study area.
- **Phase 3: Who Are We and Where Do We Want to Go?** Establish future goals and aspirations based on values of the state, region, community, or study area.
- **Phase 4: What Could the Future Look Like?** Create baseline and alternative scenarios.
- **Phase 5: What Impacts Will Scenarios Have?** Assess scenario impacts, influences, and effects.
- **Phase 6: How Will We Reach Our Desired Future?** Craft the comprehensive vision. Identify strategic actions and performance measures.

Many transportation agencies, including state Departments of Transportation (DOTs), metropolitan planning organizations (MPOs), and rural planning organizations (RPOs), have already applied scenario planning techniques in their communities. Each scenario planning approach is unique; the specific topics or issues addressed will depend on the resources available and other factors, such as the size and location of the community. The guidebook is designed to provide an overall structure for scenario planning.

The framework's six phases are illustrated on page 6. For each phase, the guidebook provides questions, considerations, steps, and strategies to help guide agencies in managing and implementing a comprehensive scenario planning effort. The guidebook also describes potential outputs from each phase. While this guidebook focuses on regional-scale scenario planning processes, it recognizes that scenario planning is flexible and can be used for a statewide, corridor-level, or neighborhood-scale approach.

While the phases are organized linearly, they might be iterative or occur at the same time. For example, agencies could present analysis results to the public as part of Phases 5 or 6. Depending on the feedback received, agencies could return to Phases 4 and 5 to refine or enhance scenarios, revise indicators, and conduct further analysis. As indicated by the left-hand tabs, data collection, identification and refinement of analysis tools, and stakeholder involvement will likely occur during several phases.

The guidebook assists transportation agencies with using scenario planning to address transportation issues, land-use changes, population growth or declining growth, as well as other topics that are important to the state, region, community, or study area, including climate change and uses of alternative energy. The latter topics are starting to be considered in scenario planning, and this guidebook can assist agencies in these efforts. Using the scenario planning technique, transportation agencies can make better decisions about how to develop a transportation system that responds to a wide range of factors and trends.

1. Introduction

What Is Scenario Planning?

Scenario planning is a process that can help transportation professionals to prepare for what lies ahead. It provides a framework for developing a shared vision for the future by analyzing various forces (e.g., health, transportation, livability, economic, environmental, land use), that affect communities. The technique was originally used by private industry to anticipate future business conditions and to better manage risk.

Since 2004, the Federal Highway Administration (FHWA) has encouraged transportation-focused scenario planning as an approach that enhances the traditional planning process. This type of scenario planning is a technique designed to help citizens and stakeholders in the public and private sectors understand how demographic and land-use changes could potentially impact transportation networks in a state, community, region, or study area.

The hallmark of scenario planning is identifying land-use patterns as variables (rather than as static inputs) that could affect transportation networks, investments, and operations. Other variables might include demographic, economic, political, and environmental trends. Considering and analyzing alternative possibilities for each variable helps stakeholders to understand how a state, community, region, or study area might look and function in the future.

Scenario planning creates guiding principles for future potential conditions. These principles become a basis for scenarios. Stakeholders, including the public, compare scenarios, using either qualitative or quantitative methods. The ultimate outcome is a shared future vision that provides a framework for transportation priorities, goals, recommendations, and investments. Through comparing scenarios and discussing their possible outcomes, the technique helps participants to identify and challenge assumptions about the future, discuss tradeoffs, and make better decisions.

FHWA's Scenario Planning Program

FHWA views scenario planning as an enhancement of the traditional transportation planning process. The technique helps practitioners to consider how changes in transportation, land use, demographics, or other factors could affect communities. As a result, scenario planning can help stakeholders to make decisions for the present and prepare for future needs.

In support of scenario planning, FHWA has:

- Encouraged the use of Federal metropolitan planning and other transportation funds.
- Identified scenario planning resources, including visualization and analysis tools.
- Facilitated peer workshops on scenario planning best practices and process steps.
- Developed tools, such as this guidebook, to assist practitioners with implementing the technique.

For more information on the FHWA scenario planning program, see www.fhwa.dot.gov/Planning/scenplan/index.htm.

Scenario planning is a flexible approach that can be used in areas of fast, slow, or declining growth to address questions related to quality of life, development, transportation infrastructure, and financial resource management. The technique has been used at a range of geographic scales (including at the nationwide, statewide, regional, community, and corridor-specific levels). Public involvement is a critical component in using the technique.

Key Elements of Scenario Planning

This guidebook presents a suggested framework for scenario planning process steps; however, each scenario planning effort will differ depending on the issues addressed and the resources available.

While scenario planning can be implemented in many ways, the key elements include:

- Use of scenarios to compare and contrast interactions between multiple factors, such as transportation, land use, and economic development.
- Analysis of how different land-use, demographic, or other types of scenarios could impact transportation networks.
- Identification of possible strategies that lead a state, community, region, or study area toward achieving elements of the preferred future.
- Public engagement throughout the process.

Scenario planning shares common elements with both alternatives analysis and visioning exercises, but primarily differs from these processes in examining interactions between multiple factors, including both internal and external forces, as a way to assess possible future outcomes.

Transportation and Land-Use Scenario Planning

The focus of this guidebook is on the use of scenario planning in a transportation context.

This specific application of scenario planning to transportation emerged over time, with early efforts beginning in the 1960's. 1000 Friends of Oregon, a nonprofit, provides an example of an early scenario planning effort. The nonprofit engaged in scenario planning throughout the 1990's.[1] This effort, which became a project of national reputation, was one of the first comprehensive, well-publicized initiatives to consider alternatives to highway expansion and development of transportation modeling tools to forecast travel behavior associated with new land-use patterns.

Scenario planning also grew from the alternatives analysis required as part of National Environmental Policy Act reporting.[2]

Over time, the application of transportation scenario planning has become much more common. FHWA has collected numerous examples nationwide of transportation agencies' use of the technique.[3]

Scenario Planning and Alternatives Analysis

Scenario planning and alternatives analysis share some common features in that both consider a range of options to identify a preferred path forward. However, scenario planning focuses on a range of interactions between both more controllable, or internal, factors (e.g., transportation investments) and less controllable, or external, factors (e.g., political and economic trends). It should be noted that

[1] For more information on the 1000 Friends of Oregon effort, see www.onethousandfriendsoforegon.org/resources/lutraq.html.
[2] Keith Bartholomew. "Land-use transportation scenario planning: Promise and reality." *Transportation 34* (2007). Available at www.springerlink.com/content/r20nt5g521n27854.
[3] For more information on the background of scenario planning, see Keith Bartholomew's "Integrating land use issues into transportation planning: Scenario planning" (2005). Available at faculty.arch.utah.edu/bartholomew/SP_SummaryRpt_Web.pdf.

alternatives analysis has not traditionally focused on these types of interactions. Scenario planning also differs from alternatives analysis in emphasizing public stakeholder involvement to create options (scenarios) and assess outcomes.

Scenario Planning and Visioning
Scenario planning also shares common elements with visioning, a process that typically involves gathering input from diverse stakeholders to set priorities and identify goals for long-range issues. Many transportation agencies have used visioning exercises as stand-alone efforts or have integrated them into a comprehensive planning process. Most often, these exercises have helped to identify community goals and aspirations through workshops, focus groups, and other events. While scenario planning can incorporate visioning exercises, it differs from visioning in that it assesses interactions between transportation, land use, and other factors to examine potential future outcomes.

What Are Scenarios?

Scenarios are narratives or sets of assumptions that explore plausible trajectories of change. They provide a means of visioning possible future changes and different policy and investment options. Scenarios translate complex thoughts into descriptions about what could be in the future. Stakeholders assess scenarios through qualitative comparison, brainstorming, use of visualization tools, application of travel demand models, and use of scenario analysis tools. Examples of these tools are provided in Phase 4, which focuses on creating baseline and alternative scenarios.

What Issues Can Scenario Planning Help Address?

Practitioners implementing scenario planning can include State Departments of Transportation (DOTs), metropolitan planning organizations (MPOs), regional governments (e.g., Councils of Government),

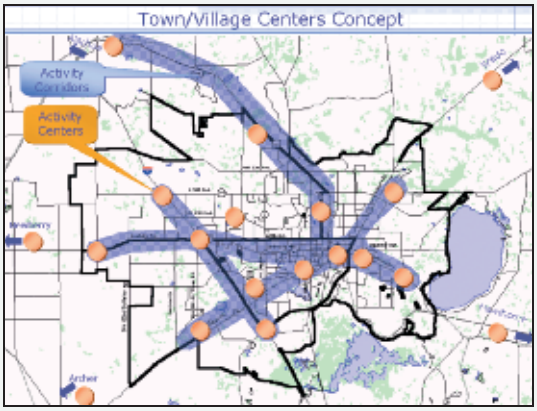
Types of Scenarios

There are many types of scenarios. Some scenarios focus on telling a story about the future as a way of visioning possible changes. Others do not involve narratives but rather sets of assumptions that examine future possibilities.

For example, the Metropolitan Transportation Planning Organization (MTPO) for the Gainesville Urbanized Area developed four scenarios as part of a 2005 update to its 2025 long-range transportation plan.* Each of the MTPO's scenarios provided different sets of assumptions about future growth patterns, including compact growth, radial development along existing major arterials, and westward growth.

MTPO's compact growth scenario assumed focused growth in the community's core, including higher-density, vertical development, such as tall office buildings. A second scenario, the town/village centers concept, most closely reflected the North-Central Florida counties' adopted comprehensive plans. This scenario assumed focused development within certain areas and higher-density activity centers to connect modes.

The graphic below illustrates the town/village centers concept scenario.



*For more information about the Gainesville MTPO, see http://ncfrpc.org/mtpo/index.html.

rural planning organizations (RPOs), and nonprofits.

Each scenario planning effort might address a different set of issues. Some agencies have used scenario planning to help develop a statewide or regional vision for growth and development and to identify specific principles or strategies that support the vision. Other agencies have implemented scenario planning to test possible futures once a vision has already been developed. Scenario planning can help to support long-range planning activities, such as the update to a long-range transportation plan. The technique also supports integrated planning and statewide, regional, or corridor planning, as well as visioning activities not associated with long-range planning.

Scenario planning practitioners have typically focused on the relationships between transportation, land use, and population growth or declining growth, using scenarios to build consensus around preferred transportation investments or growth patterns.

More recent efforts, which FHWA has identified as “next generation” scenario planning due to their consideration of factors that are beyond the agency’s control, use scenarios to explore broader risks and potential transportation impacts associated with:

- New demographic shifts, such as aging populations.
- Technological developments, such as alternative fuels.
- Fuel prices, including peak oil production.
- Climate change and associated policies.
- Economic shifts.

In both traditional and next generation scenario planning, practitioners typically create a baseline scenario, which assumes that present plans for transportation investment are carried out and that recent development patterns remain the same. Alternative scenarios might also be created to examine how changes in baseline assumptions, trends, or investments might affect the region or study area. For example, an alternative scenario could look at how new land-use policies or changes in residential development patterns might affect the transportation network. As another example, an alternative scenario could look at what might happen in the region if transportation funding was significantly cut and planned investments were curtailed. Traditional scenario planning efforts assess scenarios by using measures, such as vehicle miles traveled, shifts in modal split, impacts on open spaces, or contributions to air pollution. Next generation scenario planning efforts might use a greater range of measures, such as:

- Water use.
- Walkability.
- Greenhouse gas emissions.
- Vulnerabilities to sea-level rise.
- Energy consumption.
- Impacts on public finance.

The specific issues addressed by a scenario planning process will depend on the state, community, region, or study area.

What Is the Purpose of This Guidebook?

This guidebook is designed to assist transportation agencies with carrying out a scenario planning process from start to finish. It presents the six key phases that agencies are likely to encounter when implementing a scenario planning process. The guidebook focuses on implementing a regional-scale scenario planning process. However, the scenario planning approach is flexible and can be used on multiple scales.

Each scenario planning process is unique, and the specific topics or issues addressed will depend on resources available and other factors, such as the size and location of the community. However, the

six phases provide an overall structure for transportation scenario planning. Agencies can use these phases to tailor an approach that meets their specific needs.

The guidebook assists transportation agencies with using scenario planning to address transportation issues, land-use changes, population growth or declining growth, as well as other topics that are important to the state, region, community, or study area, including climate change and uses of alternative energy. The latter topics are starting to be considered in scenario planning, and this guidebook can assist agencies in these efforts. Using the scenario planning technique, transportation agencies can make better decisions about how to develop a transportation system that responds to a wide range of factors and trends.

A potential output of the scenario planning process is a comprehensive vision that identifies how state, community, region, or study-area stakeholders would like the transportation system to look and function in the future, given anticipated factors and trends. In addition, an action plan could be developed that includes performance measures for assessing progress toward the vision. These outputs are described in more detail in Phase 6.

How Is This Guidebook Organized?

This guidebook contains sections that address a specific phase of the scenario planning process:

- **Phase 1: How Should We Get Started?** Scope the effort and engage partners.
- **Phase 2: Where Are We Now?** Establish a baseline analysis. Identify factors and trends that affect the state, region, community, or study area.
- **Phase 3: Who Are We and Where Do We Want to Go?** Establish future goals and aspirations based on values of the state, region, community, or study area.
- **Phase 4: What Could the Future Look Like?** Create baseline and alternative scenarios.
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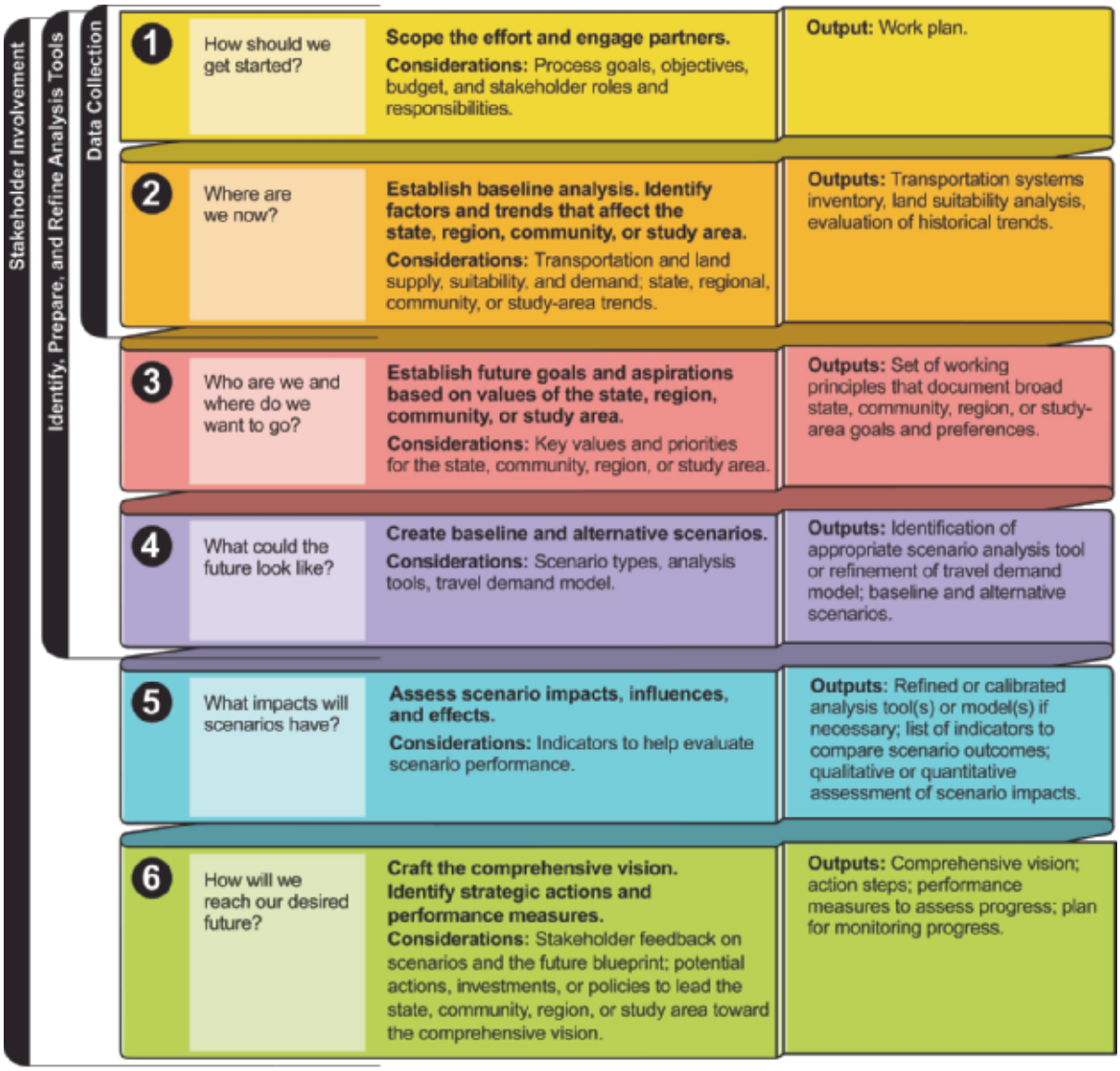
The graphic on the next page details the overall six-phase framework.

For each phase, the guidebook provides questions, considerations, steps, and strategies to help guide agencies in managing and implementing a comprehensive scenario planning effort. The guidebook also describes potential outputs from each phase. The conclusion to this guidebook contains information on additional resources to facilitate scenario planning.

Considering each phase in turn will help agencies structure a comprehensive scenario planning effort. However, these phases are suggestions and not prescriptions. Additionally, while the six phases are organized in a linear fashion, they might be iterative or occur at the same time. For example, agencies could present analysis results to the public as part of Phases 5 or 6. Depending on the feedback received, agencies could return to Phases 4 and 5 to refine or enhance scenarios, revise indicators, and conduct further analysis. Data collection, identifying and refining analysis tools, and stakeholder involvement will likely occur at the same time as several of the phases, as indicated by the left-hand tabs.



FHWA six-phase scenario planning framework

Phase 1: How Should We Get Started?

Scope the effort and engage partners.

Phase 1 focuses on initiating a scenario planning effort by identifying the major objectives of the process and the resources needed to support the effort. Phase 1 also engages partners and identifies ways to integrate scenario planning into existing agency policies and programs. Scenario planning does not need to be a separate effort but can be integrated into ongoing activities, such as work to update the metropolitan transportation plan or the long-range transportation plan.

There are several steps to Phase 1. Agencies should identify:

- 1.1 – Objectives of the process, anticipated goals, and major components.
- 1.2 – A scope and budget.
- 1.3 – Roles and responsibilities for stakeholders involved.

Each step is listed on the next page, along with associated key questions that agencies can consider. Some steps provide examples of additional issues or questions for further consideration.

Scenario Planning Duration and Cost

The duration and cost of a scenario planning effort depend on a number of factors, including:

- The agency's specific goals for using scenario planning.
- External timelines associated with other planning processes.
- Level and type of public involvement.
- Agency staff size and capabilities.
- Development of analysis tools.
- Access to data.

Agencies participating in FHWA scenario planning workshops have reported that a typical regional scenario planning effort could take between six months and two years, but the process could be longer if the region or study area is very large or complex.

Scenario planning costs can range significantly, from $50,000 or less for a small effort to $5 million or more for a large effort coordinated by several agencies.*

* Cambridge Systematics. "State-of-the-Practice Alternative Land Use and Transportation Scenario Development: A Review of Eight Metropolitan Planning Organization Case Studies" (2009). Available at www.oregon.gov/ODOT/TD/TP/docs/HB2186page/USScenarios.pdf.

Step 1.1: Identify the objectives, anticipated goals, and major components of the process.

- Define and document the intention and purpose of the scenario planning effort, as well as anticipated goals.
    - Consider what questions the effort will help to answer and how the technique should be used.

- Reach out to the public and other partners, including local elected officials, the business community, community nonprofits, and regional authorities, as part of the process to identify objectives and goals. Establishing partnerships early can allow stakeholders to take ownership of the effort and help encourage widespread support. This can be particularly important if scenario planning will be a regional effort. Engaging and connecting with regional interests from the beginning can promote better working relationships and might lead to identifying new resources. For example, by partnering with the local parks and recreation department, the MPO for the Cheyenne, Wyoming, region was able to obtain additional funding for its scenario planning process and build from an ongoing planning effort focused on green and open spaces.

Integrating Scenario Planning into Transportation Planning

Scenario planning can be integrated into transportation planning processes in different ways:

- As a preliminary step to produce a vision or guiding principles that later become a framework for a transportation plan.
- In advance of long-range or corridor planning to develop an understanding of the need for change or to highlight the importance of specific issues in transportation planning.
- Throughout development of long-range or corridor plans, to involve the public and other partners as well as identify potential outcomes of transportation investments, land-use or growth patterns, or other trends.

Step 1.2: Develop a scope and budget.

- Consider how this effort could or will build on previous, ongoing, or future planning or project programming efforts.

- Identify and consider external (e.g., Federal, state, regional, or local) timeframes, policies, mandates, or requirements that could affect the scenario planning process, budget, or schedule.

- Identify overall resources that could provide a foundation for the effort.
    - Have scenario planning efforts occurred in other areas, this community, or this region in the past that could be used as models or guides for the effort?
    - What funding opportunities, staff capabilities, or other resources are available to support scenario planning?

  - Will all components of the scenario planning effort be managed in-house or is consultant assistance needed?

- Consider what time horizon is appropriate for the scenarios and the general issues that scenarios might address.

- Consider how stakeholders, decision-makers, and the public will be engaged in the effort.

Step 1.3: Identify roles and responsibilities for involved stakeholders.

- Consider staffs' roles in the process. Who are the lead agencies for the effort and what are their responsibilities?

- Identify partners' and public stakeholders' roles and at what stage(s) during the process they will be involved. Defining stakeholders' roles will help to identify the types of public participation methods used.

Developing a Coalition for the Scenario Planning Effort

Scenario planning is most effective when a broad coalition of stakeholders and partners are involved. Throughout each phase of the process but particularly in Phase 1, agencies should explore opportunities to partner with others to build a broad coalition of stakeholders.

Potential partners could include:

- The business community
- City/town departments or agencies (e.g., department of parks and recreation, department of public health)
- Community nonprofits
- Developers
- Economic development organizations
- Emergency responders
- Environmental groups
- Historically underrepresented community members
- Homeowners associations
- Land-use authorities
- MPO board members
- Regional councils or authorities
- State and Federal resource agencies
- Tribal councils and Tribal members
- Universities and schools
- Utility providers

Phase 1 Output

A possible output of Phase 1 is a work plan to carry the scenario planning effort forward. This might also be the overall plan for accomplishing the update of the metropolitan transportation plan or the long-range transportation plan. The work plan is an administrative tool showing how the scenario planning effort will meet its stated goals and objectives within time and budget constraints. The work plan should explicitly document the expected outcomes and objectives for the effort and define roles and expectations for leadership and involved stakeholders. The plan should also describe anticipated technical support, research, and outreach activities.

Phase 2: Where Are We Now?

Establish a baseline analysis. Identify factors and trends that affect the state, community, region, or study area.

Phase 2 focuses on collecting data to describe the state, community, region, or study area. Data can include information about the transportation system, demographics, environmental resources and constraints, as well as land-use patterns as they relate to transportation. Obtaining baseline data is important for several reasons. First, data will be compiled into a baseline analysis to compare alternative scenario outcomes with current conditions. Baseline data can also help agencies to tailor scenario analysis tools—if such tools will be used in the effort—to reflect specific regional conditions. A range of planning partners and the public can be involved during Phase 2 to help identify and obtain baseline data.

Overall, gathering baseline data can help to answer the following questions:

- What is the current supply and demand for transportation?
- What geographic, environmental, or other constraints exist that might limit future population growth, transportation network expansion, residential development, or other changes?
- What other factors (e.g., desire for walkability or compact growth, energy use) currently affect supply, demand, and constraints?
- Given current trends, what could the future look like?

There are several steps to Phase 2. Agencies should:

2.1 – Characterize the supply, suitability, and demand for transportation and land use as it relates to the transportation system.

2.2 – Consider how trends could impact these factors in the future. Examples of trends are aging population, immigration, demographic growth, energy conservation, and transit use.

Each step is listed on the next page, along with associated key questions that agencies can consider. Some steps provide examples of additional issues or questions for further consideration.

Step 2.1: Characterize the supply, suitability, and demand for transportation and land use as it relates to the transportation system.

- Inventory and compile data resources describing current conditions. Relevant data can be obtained from many sources, including zoning regulations, design manuals, adopted plans, traffic data and existing models, census information, nationally or regionally available datasets, and satellite and remote sensing imagery. In some cases, substantial field work might be required to compile and/or refine data.
    - Characterize current development patterns (e.g., suburban, urban, single family, mixed use).
    - Ensure that data are in an appropriate format. For example, the transportation network might need to be inventoried. Zoning and land use regulations might need to be simplified into representative place types in order to facilitate geospatial modeling (which could occur in Phase 4 or 5). Traffic-count data might need to be analyzed to represent level of service and available capacity. Geological, topographical, and environmental data might need to be reviewed and analyzed to identify areas that are suitable for development.

- Consider how qualitative data compilation and analysis might be used during Step 2.1 and later phases of the process.

- Build the agency's data and/or geospatial capacity if necessary. Quantitative data, particularly data that are in a geographic information system (GIS) format, are often at the heart of scenario planning analyses. GIS data are often used to build scenarios (in Phases 3 and/or 4) or to allow stakeholders to more easily visualize scenario impacts (in Phases 3, 5, and/or 6).
    - Identify relevant organizations, such as a statewide GIS consortium, which might have applicable data and could share this information. This step might be particularly important for smaller agencies that do not have access to extensive data.
    - Build coalitions with technical or data staff in the agency; ensure that these staff members have opportunities to participate and weigh in on the baseline analysis as well as activities in later

Involving Planning Partners in Gathering Baseline Data

In 2007, the MPO for the Nashville, Tennessee, region began the Tri-County Transportation and Land Use Study to explore growth options for three of its member counties.* Results of the study will be used to generate ideas for the regional transportation plan.

The effort has involved conducting public visioning workshops to identify regional growth goals and developing several scenarios to test growth alternatives. The MPO is in the process of building a growth assessment model to assess completed scenarios.

To gather data on the suitability and desirability of buildable areas for this effort, the MPO met with focus groups to assess priority locations for development. Focus group members included planning policy-makers, real estate agents, developers, and utility departments. Qualitative information gathered from the focus groups was supplemented with quantitative data obtained from tax assessments and censuses.

*For more information about the Nashville MPO, see www.nashvillempo.org/ .

phases of the scenario planning effort.

- Consider what analysis tools might be used to assess scenario impacts. Scenario assessment occurs in Phase 4; details on types and examples of analysis tools are provided in Phase 4 of the guidebook. During Phase 2, data should be collected in formats that are appropriate for use in the chosen analysis tool(s). Remember that some analysis tools might focus more on qualitative comparison than on quantitative inputs. During this step, address the following questions:
    - How will data be analyzed to compile a baseline analysis?
    - Will baseline data be entered into a travel demand model or analysis tool?
    - What format should the data take to support this integration?
    - What actions should occur to reformat data if necessary?

- Obtain data on current conditions. Relevant data can be obtained from many sources, including zoning regulations, design manuals, adopted plans, traffic data, existing models, census information, nationally or regionally available datasets, or satellite and remote sensing imagery.

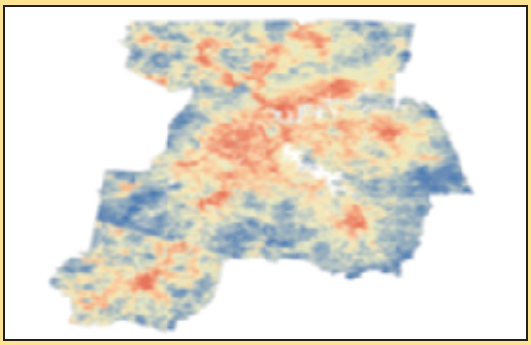
- Identify recent historical trends related to transportation and development. Address the following questions:
    - What is the historical demand for transportation and land use (e.g., as identified through use of a travel demand survey or projected employment/ population growth)?
    - What environmental, demographic, or market trends have influenced the demand for various transportation facilities, modes, or alignments?
    - How have environmental, demographic, or market trends influenced the demand for development or growth?

Building a Land Suitability Map

As part of the Tri-County Transportation and Land Use Study, the MPO for the Nashville, Tennessee, region used several modeling tools to evaluate the region's potential for growth.*

As a first step, the Nashville MPO created an aggregate land suitability map that evaluated land parcels on their proximity to several factors, such as water/sewer infrastructure, network roads, major intersections, parks and other recreational opportunities, transit stations, and environmental features (e.g., floodplains, rare species). The aggregate map will be used to assess how the region is growing and could grow in the future.

The aggregate map is shown below. Red coloring indicates the parcel(s) with highest suitability for development. Blue coloring indicates the parcel(s) with the lowest suitability.



Next, the MPO assessed demand for development. Population and employment growth were projected to 2035 for residential and nonresidential areas at the household and square-footage levels. Distribution of future growth was plotted on a map, using inputs from land suitability analyses.

The results of the land suitability and demand analysis will be used to build scenarios that explore growth options for the MPO's member counties.

*For more information on the study, see www.nashvillempo.org/regional_plan/land_use/study_tri_county.aspx.

  - How have transportation policies affected transportation demand and/or the suitability of land for development?
  - Is demand likely to change? If so, by how much?

- Verify the accuracy of supply, suitability, and demand characterizations by validating data with stakeholders. Revise as necessary. Inaccurate or invalid data can affect the success of the scenario planning process. Participants are less likely to trust the scenario planning process if they do not believe that the data are accurate and valid.
  - Consider use of visualization tools that can provide examples of existing and potential future community types to stakeholders. Examples of visualization tools are provided in Phase 4 of the guidebook.
  - Consider how to engage stakeholders to validate characterizations (e.g., through focus groups, polling, and visual preference surveys).

Step 2.2: Consider how trends could impact these factors in the future.

- Consider and evaluate *local* trends or factors that impact supply, suitability, and demand characterizations.
  - Consider how factors and trends could change over time.
  - Identify strategies to obtain information on relevant local trends and issues, such as obtaining data on relevant topics from partner organizations, conducting interviews with key stakeholders, or convening focus groups to acquire additional information.

- Consider what *external* trends and factors occurring outside the state, community, region, or study area might impact transportation and land use.
  - Consider how factors and trends could change over time.
  - Identify strategies to obtain information on relevant external trends and issues, such as obtaining data on relevant topics from partner organizations (e.g., statewide or regional data clearinghouses), conducting interviews with key stakeholders, or convening focus groups to acquire additional information.

- Include planning partners and the public in exploring how supply, suitability, and demand characterizations could change over time.

Phase 2 Outputs

Possible outputs of Phase 2 are analyses of baseline data that describe the supply, suitability, and demand of transportation and transportation-related land use in the region. The products that document the baseline conditions could include an inventory of transportation systems, a land suitability analysis, or evaluations of historical population growth or land use. Information from the baseline assessment will be used later in the scenario planning process to build and assess both baseline and alternative scenarios.

Phase 3: Who Are We and Where Do We Want to Go?

Establish future goals and aspirations based on values of the state, region, community, or study area.

Phase 3 focuses on identifying values, goals, and aspirations with input from stakeholders. Values suggest priorities and help to clarify the study area's unique or distinguishing factors. Goals and aspirations focus on what stakeholders hope to change in the future. Later in Phase 6, these values, goals, and aspirations will be enhanced and refined to create a blueprint that expresses how stakeholders want the study area to look and function in the future. The values, goals, and aspirations can also provide a framework for developing indicators to analyze scenario impacts. Overall, Phase 3 represents a first step toward developing a comprehensive regional vision that depicts the region's long-term desired transportation and development patterns for urban, suburban, and rural settings. The process of enhancing and refining the vision occurs in Phase 6.

An important aspect of Phase 3 is to consider how stakeholders, including the public, will be involved in defining values and creating goals and aspirations. Building common ground among stakeholders early on is crucial to help agencies obtain broad support for the comprehensive regional vision and the scenario planning process as a whole.

Some agencies have used scenarios to identify future goals and aspirations rather than as building blocks for the scenarios. Examples of each approach are provided later in Phase 3. When determining which approach to take, agencies should consider various factors, including schedules and available resources. It is important to note that, depending on previous work and the effort's objectives, Phase 3 might require significant time and funding. For example, the Chicago Metropolitan Agency for Planning (CMAP), the regional planning organization for northeastern Illinois, spent about 18 months on the visioning stage of its scenario planning effort.

Scenario Planning and Public Involvement

Public involvement is an important and integral aspect of scenario planning. Agencies can involve the public in scenario planning through use of visualization tools, polling or surveying techniques, or workshops, focus groups, and other events. In addition, scenario planning analysis tools (e.g., CommunityViz, MetroQuest, INDEX software) can help to translate scenario outcomes to enable the public to more easily understand them. Often, these types of tools use GIS-based software to overlay data on maps.

Scenario narratives are powerful tools for making complex, multifaceted interactions more concrete. They are devices that allow the public to weigh in on desired actions, policies, and investments that support statewide, community, or regional goals.

Meaningful public engagement throughout a scenario planning process can help to build a vision and the broad support needed to achieve that vision. Through scenario planning, the public can offer perspectives on changes that might occur, assess how changes might impact the study area, and identify tradeoffs and priorities.

For example, the Thomas Jefferson Planning District Commission (TJPDC) provides local and regional planning assistance to the City of Charlottesville and five surrounding counties in Virginia.* TJPDC also houses the Charlottesville-Abermarle MPO. TJPDC adopted a scenario planning approach in the early 2000s to address regional livability issues.

As part of the approach, TJPDC worked with the public to develop an extreme urban development scenario that introduced questions such as whether it was desirable to increase the height of existing buildings, thus diminishing tree cover and changing the city's historical character to accommodate growth. In this case, the technique helped participants to understand the importance of considering tradeoffs and compromises that maintained the region's overall quality of life.**

* For more information about TJPDC, see www.tjpdc.org/index.asp.
** For information on outcomes from the TJPDC's scenario planning effort, see www.fhwa.dot.gov/Planning/scenplan/ngscenplanrpt.htm#case5.

There are several steps to Phase 3. Agencies should:

3.1 – Brainstorm and document key values and priorities for the state, community, region, or study area.

3.2 – Compile the preferences into a set of working principles for how the state, community, region, or study area wants to move forward. These principles will provide a framework for developing scenarios. The principles can be refined and further developed during Phase 6, after scenario development and analysis.

Each step is listed below, along with associated key questions that agencies can consider. Some steps provide examples of additional issues or questions for further consideration.

Step 3.1: Brainstorm and document key values and priorities for the state, community, region, or study area.

- Consider previous visioning efforts that have occurred. Identifying values and priorities does not have to start from scratch but can build on previous efforts.

- Involve public stakeholders in identifying values and priorities.
    - Any public outreach activity conducted should help participants come to a better understanding of often-controversial terms such as sprawl or density.
    - Use of images or renderings can help to illustrate what terms might look like in the context of a specific state, community, region, or study area. For instance, in a major city, density might look like multistory infill structures. In a small town, it might look like two-story residences or mixed-use buildings.
    - Questions posed via public outreach could include:
        - What is most important about our community?
        - How will we live in the future?
        - Where will we live?
        - How will we get there?

Approach A: Using Scenarios to Identify Regional Goals

The Metropolitan Washington Council of Governments (MWCOG), the regional organization of local governments in the Washington, DC region, conducted a one-day "scenario thinking" exercise in 2008 as part of its Greater Washington 2050 initiative.* The initiative, led by MWCOG and a coalition of public and other stakeholders, focused on fostering consensus on key issues and strategies to improve the quality of life for residents over the next several decades.

From discussion with focus groups that included MWCOG and Greater Washington 2050 staff, MWCOG developed four scenarios. These scenarios described how key global and national trends could affect the region over the next 30 to 40 years. Scenarios were presented to approximately 90 regional leaders who attended a one-day workshop in November 2008. Workshop participants identified possible strategies to help the region adapt to the circumstances presented in each scenario.

From these responses, MWCOG crafted a set of Ten Big Moves, which include "pursue transit-oriented development" and "strengthen regionalism." The Ten Big Moves are building blocks for policies that the region could adopt to address varied challenges and opportunities.**

* For more information on MWCOG and the Greater Washington 2050 initiative, see www.mwcog.org and www.regionforward.org.
** For information on outcomes from the scenario exercise, see www.fhwa.dot.gov/Planning/scenplan/ngscenplanrpt.htm#case3.

- Decide how to obtain stakeholder support for values, goals, and aspirations.
    - Use of surveys, polls, focus groups, or interactive exercises can help in collecting and synthesizing feedback and input. For example, the Martin and St. Lucie MPOs in Florida conducted a scenario planning effort to develop a regional long-range plan. As part of the effort, the MPOs conducted a series of public workshops involving a community design exercise to help participants identify and communicate values and preferences. During the exercise, groups of participants viewed plans of different place types, such as a traditional suburban mall. Groups were asked to comment on their "likes" and "dislikes" about each place type and to develop strategies that could address "dislikes," such as inefficient use of space and poor pedestrian connectivity. The MPOs' consultant used the results of the exercises to build four scenarios based on combinations

of place types: a buildout scenario focusing on existing development patterns, a trend scenario based on the existing comprehensive plan, a contained edge scenario emphasizing existing city centers and rail, and a western parkways scenario including new urban centers and transit.

- Select the criteria that will be used to assess the relative importance of community or regional values.

Step 3.2: Compile preferences into a set of working principles. These principles can be refined and enhanced during Phase 6.

- Categorize values into topic areas. These topic areas can be expanded to form a set of working guiding principles. For example, the guiding principles used by CMAP for its GO TO 2040 vision were focused on sustainability, equity, and innovation.
- Validate the guiding principles with stakeholders to ensure that they accurately capture a consensus on values and priorities.
- Begin to identify or brainstorm what actions could occur to further the guiding principles as well as what policies might be necessary to implement the actions.
- Brainstorm and identify indicators to help assess scenario impacts. Indicators are statistical values (e.g., level of employment) that allow comparison of scenarios.

Approach B: Using Regional Goals to Develop Scenarios

TJPDC used the Sustainability Accords, a set of 15 principles developed in the 1990's, as a basis for creating scenarios and conducting public outreach.* These principles included "conserve energy," "retain forest and farm land," and "promote appropriate scale for land use."

During initial scenario planning public workshops, TJPDC asked participants to identify suggestions to improve the region's livability with a focus on achieving the principles outlined in the accords. Participants' suggestions were developed into three distinctly different scenarios: dispersed, urban core, and town centers. Indicators relating to the principles were also developed to assess scenario performance. Indicators are illustrated and described in more detail in Phase 5.

Phase 3 Outputs

Possible outputs of Phase 3 are working principles that document the broad values, goals, and aspirations expressed by state, community, regional, or study-area stakeholders. The principles provide a basic framework for scenario development, analysis, and the comprehensive vision resulting from Phase 6.

Phase 4: What Could the Future Look Like?

Create baseline and alternative scenarios.

Phase 4 focuses on developing multiple scenarios, including baseline and alternative scenarios, to assess how future changes could impact the transportation system as well as travel demands or needs. Scenarios combine the trends and variables identified in Phase 2 and values, goals, and aspirations identified in Phase 3 with appropriate policy and investment responses, creating plausible and distinct alternative pictures of how the community, region, or study area might look and function in the future. These alternatives translate broad concepts and possibilities into compelling narratives or stories that can help planners, politicians, the public, and others to weigh and consider transportation choices and priorities. The scenarios provide a common framework for all parties to discuss the costs and benefits of transportation decisions while taking future uncertainties into consideration. Many agencies have involved the public in all stages of Phase 4.

To develop scenarios and later assess their impacts, some agencies have used travel demand models or models developed specifically for transportation and land-use scenario planning. Examples of scenario planning analysis tools include INDEX, CommunityViz, MetroQuest, and UrbanSim. Many of these tools use a GIS format so that users can geospatially plot scenarios and more easily visualize outcomes. Use of these analysis tools to assess scenarios is discussed in further detail in Phase 5. Agencies can facilitate the scenario planning process by identifying appropriate tools or models as early as possible.

The types of scenarios developed and the specific elements they include will vary depending on the focus and goals of the scenario planning process. A few examples of different types of transportation and land-use scenarios and associated questions are provided below:

- Baseline scenarios: What might the future look like given the continuation of current policies, programs, and development forms?
- Growth/socioeconomic scenarios: What might the future look like given different population or growth projections?
- Policy scenarios: What might the future look like given combinations of different policies, actions, or strategies, such as policies focused on mode splits, asset management, or preservation?
- Environmental scenarios: What might the future look like given different environmental trends and needs?
- Economic scenarios: What might the future look like given different trends in various sectors of the economy?
- Hybrid scenarios: Combinations of several scenario types.

There are several steps to Phase 4. Agencies should:

4.1 – Identify needs for scenario development.
4.2 – Refine existing analysis tools or the travel demand model if necessary.
4.3 – Prioritize trends and factors most important to transportation and land use in the region (from the local and external trends and factors identified in Phase 2); assess interaction with goals, aspirations, and values (from those identified in Phase 3).
4.4 – Identify potential strategies or actions to address trends.
4.5 – Compile the trends and strategies identified in Steps 4.2, 4.3, and 4.4 into several scenarios. Each scenario offers a plausible alternative vision of how the future could evolve and how the state, community, region, or study area could respond.
4.6 – Communicate scenarios to stakeholders.

Each step is listed below, along with associated key questions that agencies can consider. Some steps provide examples of additional issues or questions for further consideration.

Step 4.1: Identify needs for scenario development.

- Determine what general type(s) of scenario(s) is/are necessary for the effort, such as:
  - Baseline
  - Growth/socioeconomic
  - Policy
  - Environmental
  - Economic
  - Hybrid

  Scenarios do not need to address every future possibility; rather, they should help to foster discussion around key issues facing the study area.

- Consider how scenarios should be labeled or named. Some general examples of scenario names include traditional growth, compact center, moving inward, system preservation, and technological innovation. Scenario names can be associated with values; to avoid potential bias, practitioners should consider using more neutral labels, such as regional scenario, Scenario A, or Scenario 1.

- Identify the resources that will be necessary to develop scenarios. This step must consider the extent and format of available data (compiled in Phase 2) and its compatibility with various analysis tools. Address the following questions:
  - Will scenario analysis use quantitative or qualitative data, or both?
  - Will building or analyzing scenarios require significant data collection or software development efforts?
  - What data will be required?
  - What data and analysis tools are currently available to support these efforts?
  - What additional resources could be used if quantitative data are unavailable or not needed in the effort?

- Determine what elements of scenarios need to be measured on the basis of public input and the future values, goals, and aspirations documented as part of Phase 3. Next, identify the tool that can measure these factors most effectively given the specific conditions facing a particular agency. When choosing a scenario analysis tool, the primary factors to consider are applicability, cost, and complexity.
  - *Applicability*
    - What questions will the tool help to answer?
    - Has the tool been applied in other regions in the state or in regions addressing similar issues?

        - Are existing analysis tools sensitive to the key factors and driving forces identified in Step 2?
        - How will scenario descriptions be translated into modeling terms?
    - *Cost*
        - How much will this tool cost?
        - Are there sufficient staff resources to prepare and run the tool, or are additional resources needed?
    - *Complexity*
        - What data does the tool require and at what scale? What amount of data is required?
        - What analysis capabilities (outputs) are desired? What outputs will the tool produce and in what format?
        - Will outputs be easy for the public or other stakeholders to understand?

Using Qualitative Analysis

MWCOG developed qualitative scenarios as part of the Greater Washington 2050 initiative, an example also described in Phase 3. The qualitative scenarios focused on a wide range of trends. Scenario analysis was conducted through discussions with regional leaders in a workshop format.

MWCOG believed that the use of qualitative scenarios was best suited for the Greater Washington 2050 initiative as they could capture a wide range of variation and potential trends. While quantitative scenario modeling is useful and appropriate for some scenario planning efforts, MWCOG noted that some models rely on forecasts rather than outside-the-box thinking to assess future impacts. In addition, MWCOG noted that some models might portray only modest variations among scenarios and might not be finely attuned to land-use pattern changes.

MWCOG based its qualitative scenarios on themes that emerged from focus group interviews. These themes were related to the region's economy, energy prices, and technology.

Local professionals and researchers reviewed scenario assumptions to ensure their plausibility. During the one-day scenario thinking exercise, participants discussed scenarios. Additionally, local experts in climate change, technology, and economics presented on key regional trends to provide credibility, context, and additional details for the scenarios.

Step 4.2: Refine existing analysis tools or the travel demand model if necessary.

- Identify factors to which the analysis should be sensitive. In Phase 5, these factors might be refined into indicators for measuring scenario impacts or effects.
- Determine whether and how each factor is incorporated into existing travel demand models or analysis tool.
- Refine model(s) or tools to incorporate sensitivity to the key factors. For example, the Southern California Association of Governments is currently working to add an analysis of greenhouse gas emissions to its transportation and land-use model.
    - Perform validation and calibration if necessary.

- Consider supplementing models or tools with research and/or qualitative analysis for factors that cannot be directly incorporated.

Step 4.3: Prioritize trends and factors (identified in Phase 2) important to transportation and land use; assess interaction with goals, aspirations, and values (identified in Phase 3).

- How would these trends and factors evolve in the future and what might the impacts be on transportation and land use? For example, assuming a certain percentage of future population growth, where would activity centers be located and what percentage of jobs would be located in these centers? What mode(s) of travel might the population use to access jobs? In the Washington, DC, region, the physical location of Federal government offices has a major impact on transportation needs. MWCOG developed a Federal government dispersal scenario to investigate impacts if this trend did not continue.
    - Which changes are predictable and which are difficult to predict?
    - What are the key assumptions underlying travel demand forecasts? What would happen if these assumptions changed?
    - Are mandated data, such as state-mandated population forecasts, reflected in the forecasts?
    - How are other organizations, stakeholders, or agencies in the state, community, region, or study area likely to respond to possible changes? How might these responses affect future land-use and travel demand?
    - How do the goals, aspirations, and values articulated by stakeholders in Phase 3 interact or compare with evolving trends and factors?

Step 4.4: Identify potential strategies or actions to address trends.

- Consider the strategies, actions, investments, or potential responses that could support addressing the important trends that will occur over time. For example, assuming that fuel prices increased dramatically, what policies and investments would help to keep the region strong and competitive?

Step 4.5: Compile the trends and strategies identified in Steps 4.2, 4.3, and 4.4 into several scenarios. Each scenario offers a plausible alternative vision of how the future could evolve and how the state, community, region, or study area could respond.

- Develop a baseline scenario that reflects the baseline analysis and assumes no changes in actions, policies, and investments.

- Develop several alternative scenarios by varying the assumptions that underlie travel demand forecasts, growth forecasts, or other anticipated trends. The number of scenarios can vary; two to four is generally sufficient to provide a range of alternatives without overwhelming stakeholders.

- If software tools are used to develop scenarios, input necessary data to build both baseline and alternative scenarios.

Step 4.6: Communicate scenarios to stakeholders.

- Consider using visualization tools or other interactive techniques (see examples below) to help stakeholders understand scenarios.
- Develop a narrative or set of assumptions to describe a developed or modeled scenario.

Using Visualization Tools to Develop and Depict Scenarios

A variety of visualization tools and techniques* can help to communicate the look and feel of different development types and the impacts of scenario choices. Several examples are shown and described below:

A B C D

A. Chips exercises are a technique in which workshop participants place paper or plastic chips on a map to indicate areas of preferred growth or development. The results can be digitized using GIS-based software and presented to participants for validation and review.
B. Place-type renderings present a human-scale look and feel for development types. This example was developed as part of CMAP's GO TO 2040 effort. For more information, see www.goto2040.org.
C. Schematic images can illustrate a scenario for a broad area. This example shows the Harris Ranch area of Boise, Idaho. For more information, see www.idahosmartgrowth.org/index.php/about.
D. Many software programs are available that use GIS or visualizations to demonstrate scenario impacts and effects. This example shows how CommunityViz can depict a scenario. Other software program examples are provided in the overview to Phase 4.

* For more information about visualization tools and techniques, see the conclusion of this guidebook. Additional resources include:
- FHWA's Visualization in Planning website, www.fhwa.dot.gov/planning/vip/.
- Federal Transit Administration-sponsored web portal on choosing visualization tools for transportation, choosingviz.org/.
- Transportation Research Board's Visualization in Transportation committee website, www.trbvis.org/MAIN/TRBVIS_HOME.html.

Phase 4 Outputs

Phase 4 has several possible outputs, including identification of an appropriate scenario analysis tool or refinement of the travel demand model if necessary. An additional possible outcome of Phase 4 is the development of several scenarios, including a scenario focused on baseline conditions and alternative scenarios that describe plausible, distinct futures for the state, community, region, or study area. Scenario descriptions should include assumptions about future trends and changes as well as potential responses, actions, and investments. Descriptions should use terms that stakeholders can easily understand.

Phase 5: What Impacts Will Scenarios Have?

Assess scenario impacts, influences, and effects.

Phase 5 focuses on analyzing scenarios. Scenario analysis typically involves assessing the impacts, influences, and effects that various scenarios exert on selected indicators. As described in Phase 3, indicators are statistical values (e.g., level of employment) or groups of values that are used to compare two or more scenarios. While Phase 5 focuses on scenario analysis through use of indicators, these indicators might have already been developed or considered in earlier phases, particularly Phase 4.

When analyzing scenarios, agencies can consider either a qualitative or a quantitative approach. Using a qualitative approach, agencies could utilize working groups or roundtables to facilitate discussion and brainstorming about scenario impacts. Agencies considering a quantitative approach could use the travel demand model or a GIS-based scenario analysis tool.

There are several steps to Phase 5. Agencies can:

5.1 – Develop or identify indicators to compare scenarios.
5.2 – Use indicators to identify scenario impacts.
5.3 – Obtain feedback on analysis and refine scenarios as needed.

Each step is listed below, along with associated key questions that agencies can consider. Some steps provide examples of additional issues or questions for further consideration.

Step 5.1: Develop or identify indicators to compare scenarios.

- Develop indicators that are discrete, measurable, and describable. Indicators should be developed for qualitative or quantitative data, depending on what information is available. Indicator development might proceed in tandem with refinement of scenario analysis tools or the travel demand model. Indicators might have already been developed or considered in earlier phases, particularly Phase 4.
    - Use agreed-upon goals, values, and/or objectives to guide development of scenario indicators and build on the set of working principles that is the possible outcome of Phase 3.
    - Use qualitative methods to compare scenarios against indicators that cannot be modeled or for which there are few data. For example, as part of its scenario planning effort, TJPDC assembled a panel of local residents with professional expertise in water resources. The panel provided a qualitative evaluation of the water-use impacts of alternative scenarios.

- Consider the tradeoffs involved with determining the appropriate number and complexity of indicators. More indicators might require more time and data but could provide a more comprehensive scenario assessment. However, fewer indicators could allow a more focused or targeted analysis.

- Consider that successful indicators highlight the key aspects of scenario outcomes. They also provide an accurate understanding of impacts as they relate to the values, goals, and aspirations established by stakeholders in Phase 3.

Step 5.2: Use indicators to identify scenario impacts.

Developing Scenario Indicators

A variety of applications and models can be used to help identify and develop indicators:

- The travel demand model can be used to gauge transportation accessibility.
- GIS-based applications can be used to assess sidewalk availability, buffer areas for transit ridership, or other impacts.
- The Environmental Protection Agency's Motor Vehicle Emissions Simulator (MOVES) model can be used to assess air quality or greenhouse gas emissions.

Examples of indicators used in previous scenario planning efforts are listed below.

<u>Environmental/land-use indicators</u>

- Acres of non-urbanized land
- Percentage of farms and forests

<u>Community livability indicators</u>

- Percentage of population living in clustered communities
- Percentage of population with access to transit
- Annual gallons of gas consumed

<u>Jobs/housing indicators</u>

- Number and/or percentage of jobs located near affordable housing
- Change in average commuting times

<u>Transportation system indicators</u>

- Number of highway congested hours
- Vehicle miles traveled by mode
- Percentage of work or all trips by mode

<u>Climate change indicators</u>

- Greenhouse gas emissions by sector and county
- Greenhouse gas emissions due to vehicle miles traveled
- Acres of land deforested for development

- Use chosen analysis tools and/or the travel demand model to assess each scenario.
    - Translate each scenario into terms that are appropriate for the analysis tool or travel demand model. For example, changes to development policies must be translated into assumed impacts on growth in each analysis unit (e.g., transportation analysis zone). Similarly, any future changes that are expected to affect travel behavior, such as aging populations, must be reflected in the model or analysis tool.

- To analyze scenario impacts with the chosen indicators, compile outputs from the qualitative analysis, travel demand model, or analysis tool.

Step 5.3: Obtain feedback on analysis, and refine scenarios as needed.

- Present results to stakeholders and obtain feedback.
    - Consider ways to present analysis results that are meaningful for stakeholders.
        - Use visualization tools to engage stakeholders.
        - Consider specific events (e.g., roundtables, panels, or workshops) to communicate scenario impacts.
        - Consider development of documents, such as brochures or fliers, to describe scenario performance.

- If needed, refine scenarios and indicators on the basis of stakeholder feedback. Scenario analysis can be repeated with a narrower set of indicators.

Developing a Matrix for Scenario Analysis

TJPDC used a matrix to illustrate scenario performance.* The matrix compared scenario outputs with general as well as specific indicators developed from the Sustainability Accords principles.

The matrix, shown below, includes analysis of each of the four scenarios (dispersed, town centers, CoreL, and CoreM) developed by TJPDC. The italicized figures under the dispersed scenario column indicate that this scenario scored lowest on every measure compared with other scenarios. The low scores indicate the public's growth preferences in rejecting a dispersed, low-density pattern in favor of clustered, enhanced communities along major corridors and key crossroads.

The numbers under the scenario columns show the comparison of each scenario's land-use and transportation networks with the measures in the left-hand column. For example, only 55 percent of land cover in the dispersed scenario was composed of farms and forests.

Measure / **Sustainability Accord**	**Dispersed**	**Town Ctr**	**CoreL**	**CoreM**
Pct. Farms and Forests **Retain resources/habitat/farms/forests**	*55*	64	65	65
Pct. Developed **Retain resources/habitat/farms/forests**	*45*	36	35	35
Pct. Living in Clustered Communities **Optimize use/cluster/human scale**	*13*	61	68	68
Pct. Non-auto Trips **Transportation Alternatives**	*4*	15	18	18
Annual Gallons Gas Consumed (billions) **Conserve Energy**	*155*	121	110	114
Pct. Travel Congested **Employment/Education Access**	*44*	27	20	21
Water Quality and Quantity **Water Quality and Quantity**	*Poor*	Good	Good	Good

Bold-faced measures correspond to the **Sustainability Accord** measures
Red/Italics — Comparatively lowest

* For more information about TJPDC's scenario planning effort and the analysis matrix, see www.tjpdc.org/community/epi.asp.

Phase 5 Outputs

Phase 5 has several possible outputs, including a list of indicators to compare scenario outcomes and a qualitative or quantitative assessment of scenario impacts. Some agencies have used tables or matrices to outline how scenarios perform against the chosen indicators. Other agencies utilizing a qualitative scenario assessment approach have summarized scenario performance in white papers or other documents, or through discussion in focus groups, roundtables, or expert panels.

Phase 6: How Will We Reach Our Desired Future?

Craft the comprehensive vision. Identify strategic actions and performance measures.

Phase 6 focuses on consolidating scenario impacts, as well as community preferences and priorities established in previous phases, into a comprehensive vision. The vision, or future blueprint, is grounded in realistic analysis and incorporates possible future changes. Text, tables, maps, and illustrations can be used to represent the vision. The vision provides a framework for building consensus on policies and strategies related to transportation, growth, land use, or other issues.

An action plan is also developed that details strategies for achieving the comprehensive vision. Potential strategies could include updates to local, regional, and state plans that propose locations for new growth and proposed investment levels, or other policies and programs relevant to transportation, land use, economic development, environmental preservation, and other key topics. The action plan also describes responsibilities for implementation and monitoring to guide progress toward the vision.

There are several steps to Phase 6. Agencies should:

6.1 – Craft a comprehensive vision.
6.2 – Validate and refine the vision.
6.3 – Develop an action plan to implement the vision and continue monitoring outcomes over time.

Each step is listed below, along with associated key questions that agencies can consider. Some steps provide examples for additional consideration.

Step 6.1: Craft a comprehensive vision.

- Use feedback from stakeholders to develop a comprehensive vision. Address the following questions:
  - What have we learned from scenario review and discussions?
  - What regional actions and investments can the lead agency or partnering agencies pursue, support, or implement that help the state, community, region, or study area achieve its desired transportation and land-use patterns?
  - What are the expected outcomes from these actions and investments?

  - How could the region manage risk and uncertainty?
  - What will the region look like and how will it function?
  - What transportation networks would be in place?
  - What land-use/development patterns would occur in the future?

- Ensure that diverse and even opposing interest groups are included in this phase. Involving diverse stakeholders in Phase 6 can encourage a more comprehensive vision as well as buy-in to minimize future opposition to adopted policies/programs.

- Develop text, maps, tables, and illustrations to describe the vision.

Creating Action Steps

Vision North Texas is public-private partnership developed to address a variety of key issues, including population growth, anticipated increasing traffic congestion, and technological innovations.

To help address these issues and potential regional responses, Vision North Texas used a scenario planning approach. The approach involved evaluating five alternative futures with the public and other stakeholders through a series of workshops held in 2009.

Vision North Texas developed a toolbox as a result of scenario analysis and other visioning activities.* Tools include policies, actions, and techniques that will contribute to achieving its vision for the future. The toolbox describes each tool, details roles and responsibilities for stakeholders who will likely use the tool, examines potential costs and funding options, and recommends steps to implement the tool.

For example, one tool is a proposal to adopt a transportation investment boundary. The policy would focus transportation infrastructure funding on existing urbanized areas to reduce urban sprawl and support compact development patterns. The North Central Texas Council of Governments is named as the primary lead for implementing this tool; a proposed first step is reviewing state legislation to assess the policy's feasibility.

* For more information about the Vision North Texas toolbox, see www.visionnorthtexas.org/regional_summit/Action_Tools.html.

Step 6.2: Validate and refine the vision.

- Validate the regional vision with stakeholders to ensure that it accurately captures values and priorities.
  - Consider how stakeholder support for various elements of the regional vision will be measured. One technique used by some organizations is the development of a community compact or regional agreement. These are formal endorsements by stakeholder organizations, stating that they will support the vision.
  - Reality-check assumptions and actions through discussion with staff and/or public stakeholders.

Step 6.3: Develop an action plan to implement the vision and continue monitoring outcomes over time.

- Identify policies, investments, and actions needed to implement the vision.
    - Do existing plans, policies, and programs relevant to transportation, land use, economic development, environmental preservation, and other key transportation-related elements support the refined vision? If not, what changes might need to be made to support the vision?
    - Do planned transportation investments support the vision?
    - What incentives are available to support regional, local, or community actions consistent with the comprehensive vision?
    - What actions are needed in the short, medium, and long term?
    - Is there sufficient flexibility to accommodate unforeseen developments and changes?
    - What transportation investments are priorities as based on the vision?

- Identify teams responsible for various actions and for overseeing progress.
    - What actions are within the agency's control?
    - What actions are less controllable?
    - Who has responsibility for leading these actions forward and assessing their progress over time?

- Develop performance measures and a monitoring plan to assess progress toward the vision. Performance measures track statistical evidence to determine progress toward meeting the goals of the adopted vision.
    - What are the critical outcomes that will indicate progress toward the adopted vision?
    - How will progress be monitored?
    - What data are needed for monitoring?
    - How will unforeseen changes and new issues be incorporated into the action plan?

Developing a Regional Vision from Scenario Planning

Envision Utah is a nonprofit created in 1995 to develop a broad and publically supported growth strategy for the State of Utah.* Between 1997 and 1999, Envision Utah conducted research and held over 200 public workshops. Scenario planning was a key part of the Envision Utah approach and helped residents to explore and test several alternative growth patterns.

Envision Utah created the Quality Growth Strategy for Utah from the feedback collected during the two-year effort. The Strategy contains goals and voluntary actions for local governments and others to consider when planning for and addressing economic development, mobility, infrastructure, and other issues.

Several communities in Utah have used an approach modeled on that of Envision Utah to conduct scenario analysis and vision planning. For example, Envision Cache Valley, a scenario planning process used to develop a regional vision in Cache Valley, Utah, was conducted in 2009.

On the basis of public feedback on scenarios, collected at town-hall meetings and through online questionnaires, the Cache Valley Regional Council and process steering committee identified overall themes and developed them into a regional vision statement. Additional public outreach was conducted to present the regional vision and solicit feedback.

Later, the Cache Valley regional vision was compiled in a comprehensive document that included pictures illustrating preferred community types and graphics demonstrating what streetscapes might look like if recommended policies (such as promoting mixed-used development) were implemented.**

* For more information on Envision Utah, see http://envisionutah.org/.
** To access the Envision Cache Valley final report, see www.envisionutah.org/ECV%20Report%20and%20Toolkit_All%20Chapters_LowRes.pdf.

Phase 6 Outputs

Possible outputs for Phase 6 are a comprehensive vision that documents the preferences and desired future of the state, community, region, or study area as well as an action plan. The action plan implements the vision and guides preferred actions and investments at the statewide, regional, community, and local levels.

Conclusion

The purpose of this guidebook is to assist transportation agencies with carrying out a scenario planning process from start to finish. The guidebook presented the six key phases that practitioners are likely to encounter when applying a scenario planning technique.

While scenario planning can be implemented in many ways, the key elements of the technique include:

- Use of scenarios to compare and contrast interactions between multiple factors, such as transportation, land use, and economic development.
- Analysis of how scenarios impact transportation networks, land-use patterns, and other issues.
- Identification of possible strategies that lead a state, region, community, or study area toward achieving elements of the preferred future.
- Public engagement throughout the process.

Each scenario planning process is unique. The specific topics or issues addressed will depend on the resources available and other factors. However, the six phases presented in this guidebook provide an overall structure for scenario planning, particularly at the regional level. Agencies can use this document to tailor an approach that meets their specific needs.

Since 2004, FHWA has encouraged scenario planning as a technique to help stakeholders understand the potential impacts of change on a state, region, community, or study area. FHWA offers numerous resources to assist transportation agencies with implementing the scenario planning technique, including guidance on scenario planning process steps as well as analysis tools and reports on innovative practices from around the country. FHWA has also offered peer-to-peer training workshops for interested agencies nationwide.

For additional resources or information on the FHWA scenario planning program or scenario planning technique, or to request a workshop, please see www.fhwa.dot.gov/planning/scenplan/index.htm

Additional Resources

Practitioners interested in using the scenario planning technique may find the following resources useful:

- FHWA and Federal Transit Administration's Transportation Planning Capacity Building Program, www.planning.dot.gov.
- FHWA land use toolkit, www.fhwa.dot.gov/planning/landuse/index.htm.
- FHWA website on land use and transportation, www.fhwa.dot.gov/planning/ppasg.htm.
- FHWA website on livability, www.fhwa.dot.gov/livability.
- FHWA website on climate change and transportation, www.fhwa.dot.gov/hep/climate/index.htm.

Transportation Planning
Capacity Building Program

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