



Advancing Transportation Systems Management and Operations through Scenario Planning



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Use of Scenario Planning in
Transportation Planning
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**Katharine Ange, AICP
Vice President, Renaissance Planning
kange@ciesthatwork.com**

Why Apply Scenario Planning to Operations?

Scenario planning principles and methods can enhance current approach to planning for operations by improving:

- Decision-making that better accounts for futures that may be different than past trends.
- Ability to address changing community values and preferences in M&O goals and objectives.
- Planning that explores changing role of technology in transportation.
- Plans that addresses resiliency in response to climate change.
- Stakeholder engagement, broader collaboration and consensus building.
- Assessment of interactions between multiple factors.
- Consideration of tradeoffs and the ability to address competing values and visions.
- Support performance-based planning.
- And more...

Tool for Integrated Planning



U.S. Department of Transportation
Federal Highway Administration
Federal Transit Administration




Scenario planning is “*best tool I know to allow the conversation to reflect different perceptions of the situation (differentiation), but in such a way to create a room for people to consider these different viewpoints and gradually align on what needs to be done, and what they want to do (integration).*”

Peter Schwartz, international leader in Scenario Planning

Scenario Planning in Transportation

- Since the early 1990's, enabled better integration of land use and transportation.
- Helps demonstrate how development influences travel behavior and travel demand.
- Engages diverse stakeholder groups.
- Most often used to plan for more desirable futures – livability, sustainability, economic prosperity.
- Helps to address the 3Cs (comprehensive, continuous, coordinated) systems planning.

Scenario Stories

-  What if past patterns continue?
Current Trend
-  What if we invest in and connect the **ports**?
Ports Centers
-  What if we embrace **technology**?
High Tech Lifestyle
-  What if we **balance** open space and development and provide **choices**?
Connected Communities

SPACE COAST LRTP 2040



Space Coast TPO, Brevard County, FL
2040 Long Range Transportation Plan

Next generation scenario planning aims “to capture a broader range of issues and challenges than previously considered in transportation and land use scenario creation and analysis.”

- Federal Highway Administration, “New Trends in Transportation and Land Use Scenario Planning.” April 2010.

Trends and Issues in Transportation

- NCHRP Report 750
 - Highlights driving issues in transportation.
 - Scenario planning an effective process to better address.
 - Climate change.
 - Shifts in travel behavior.
 - Advancements in technology.



Scenario Planning as a Tool to Support Performance Based Planning

- Natural fit – begins with the premise of determining desirable outcomes or goals.
- Allows for the establishment of multivariate indicators.
- Enables consideration of multiple strategies to meet those goals.
- Creates a framework for monitoring performance.

“Performance Based Planning and Programming (PBPP) attempts to ensure that transportation investment decisions are made – both in long-term planning and short-term programming of projects – based on their ability to meet established goals.”

FHWA’s Performance Based Planning and Programming Guidebook, 2013

Scenario Planning Trends

- Expanding application in the transportation sector.
 - Reaction to uncertainty.
 - Operational response to events.
 - Planning for system resiliency.
 - Planning for livability.
 - Performance based planning.
 - Public understanding of tradeoffs.
- Effective tool supporting Federal Partnership for Sustainable Communities.



Types of Scenario Planning

- **Predictive**
 - Alternative scenarios in response to predictable, probable trends (e.g., different rates of population/job growth, financial capacity).
- **Normative**
 - Alternative scenarios in response to a desirable future condition (e.g., we want to achieve a 30% non-auto mode split by 2050).
- **Exploratory**
 - Alternative scenarios that attempt to address future unknowns/uncertainties (e.g., how do we plan for more frequent extreme weather; 50% driverless cars on the road).

Convey Critical Information to Decision-makers

- Colorado DOT used scenario planning to demonstrate impacts of different funding levels on system performance.
- Included:
 - Cost to sustain current performance.
 - Cost to accomplish statewide vision.
- Helped decision-makers better understand impacts of funding on performance issues.

Build Partnerships and Capacity

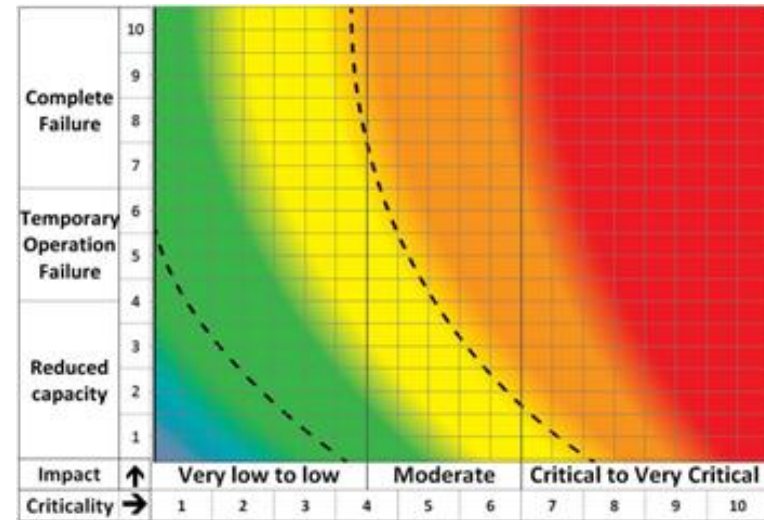
- Champaign-Urbana MPO in Illinois uses scenario planning techniques on regular basis.
- Method for engaging broad array of stakeholders and building partnerships to solve transportation challenges.
- Resulted in high levels of collaboration between agencies in data exchange, innovative technical analysis, leveraging limited transportation dollars, building political support for regional transportation initiatives.



CUUATS 2040 LRTP Outreach

Examine Uncertainties

- Washington State DOT (WSDOT) used scenario planning to identify WSDOT facilities vulnerable to the effects of climate change and to evaluate and identify possible strategies to reduce risk.
- Developed a structured, stakeholder-based approach to qualitatively assess facility risk.
- Resulted in a series of statewide and sector-wide recommendations for identifying vulnerable infrastructure and prioritizing adaptation improvements.



WSDOT's vulnerability assessment considered two factors: asset criticality and the potential impacts of the CIG climate change scenarios. The project team used a 1 to 10 rating scale to articulate the relative criticality and impact for each asset. The figure above is a visual representation of the relationship between these two factors.



SCENARIO PLANNING FOR TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSMO)



Planning for Operations

provides the critical strategic thinking for how to operate the transportation system

Key Features of Planning for Operations

- Goals
 - Establish overall direction of improved operational performance.
- Operations objectives
 - Set specific, measurable outcomes.
- Performance measures
 - Track progress and evaluate potential TSMO strategies.
- TSMO strategies
 - Improve operational performance of the system.
- Operations programs and projects
 - Funded and implemented to carry out TSMO strategies.
- Transportation system monitoring
 - Establishes operations needs and tracks progress toward objectives.

Scenario Planning to Advance TSMO

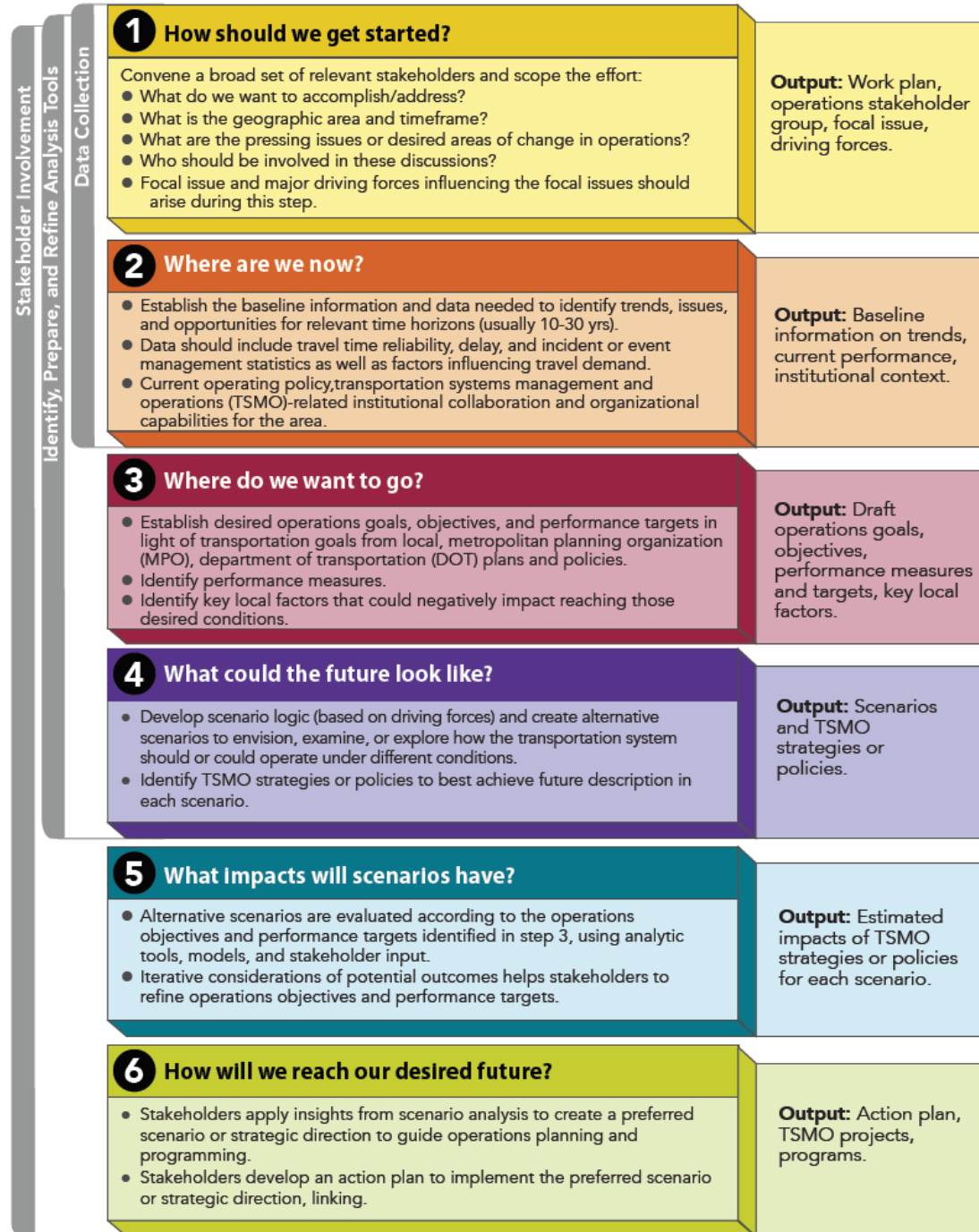
- Scenario Planning for TSMO can help
 - Address uncertainties about future conditions that impact TSMO.
 - Revisit key goals and assumptions regarding operations objectives in response to shifting travel behavior or community goals.
 - Demonstrate tradeoffs associated with different investment or development decisions.
 - Build consensus on competing goals.
 - Refine M&O objectives and measures to align with goals.
 - Better translate goals to system- or corridor-level TSMO strategies.

Collaboration is a Critical Element

- The public
- Elected officials
- Agency leaders
- Transportation planners
- City/county DOTs
- Public works departments
- Transit agencies
- Bridge and toll operators
- Port authorities
- Police, fire, and emergency response officials
- Business groups (Chambers of Commerce)
- Freight shippers

Framework

- Six phases of scenario planning
- Tied to specific outputs for M&O



Opportunities

- Regional Systems
- Statewide
- Corridor Level
- Addressing Emerging Trends

Regional Planning

- Scenario planning can help identify key community values and goals to better define operations objectives.
- Can examine different TSMO strategies to achieve those objectives.
- Outcomes can include:
 - New or refined operations objectives in regional LRTP.
 - Strategies for a Regional Concept for Transportation Operations.
 - Identification of specific investment packages to achieve operations objectives.

Sample Operations Objectives

System Options

Mode Share

- Reduce per capita single-occupancy vehicle (SOV) commute trip rate by X percent in Y years.
- Increase alternative (non-SOV) mode share for all trips by X percent within the next Y years.
- Increase active (bicycle/pedestrian) mode share by X percent by year Y.
- Reduce SOV vehicle trips by X percent through travel demand management strategies (e.g., employer or residential rideshare) by year Y.
- Achieve X percent alternative (non-SOV) mode share in transit station communities (or other destinations) by year Y.

Statewide Opportunities

- Examine uncertainties relative to fiscal conditions or significant shifts in travel demand or behavior
- Help reach consensus on statewide priorities when there are competing goals for use of statewide system

- Transportation Management Center Planning
 - Scenarios can help to examine different staffing, technology investments and TSMO strategies needed to achieve objectives
 - Help to establish cross-agency coordination and communication strategies
 - Help identify best public sector technology investments given changing private sector technology options

Statewide Opportunities

- Work Zone Management Plans
 - Scenario development process can help bring together diverse constituencies to identify best TMP for given project
- Statewide Freight Mobility Plan
 - Well suited for scenario planning given the need to address uncertainties and issues beyond state control relative to trade flows
 - Framework for engaging broad constituencies representing public and private freight and goods movement

Emerging Trends

- Autonomous Vehicle Technologies
- Shifting Travel Behavior
- Changing Weather Patterns

Discussion

- Are there other ways to apply scenario planning to planning for operations?
- Do the examples offered here seem useful? Which ones and why?

Small Group Activity

- **Group 1: Planning for Operational Resilience During a Tropical Storm**
- Large metro region experienced increased frequency and intensive flooding last two years leaving roads unpassable, power out and underground transit incapacitated
- Scenarios aimed at helping envision M&O opportunities to enhance system resiliency
- Outcome will help to identify system performance objectives, key investments and strategies for resiliency

Small Group Activity

- **Group 2: Developing a multimodal corridor operations plan**
 - 6-lane arterial that parallels a major highway, dominated by older shopping centers, fast food restaurants and some older two-story office buildings, and key connector to downtown commercial business district and the region's major job center
 - Scenarios will help identify different visions for how the corridor might evolve overtime
 - Outcome will help to reach consensus on corridor vision and menu of operational and design strategies needed to optimize multimodal system and support community goals

Activity Report Out

- What new stakeholders did you involve in the process?
- Did you develop new operational objectives?
- What were the challenges in reaching consensus on a preferred way forward?
- What new data or tools did you need?
- How can the outcomes be implemented into M&O plans moving forward?

Using Scenario Planning to Plan for Operations in Your Region



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- Based on our discussions today, what aspects of scenario planning do you think would improve your planning for operations efforts?
- Is there a specific planning for operations effort on the horizon that could benefit from scenario planning? If so, describe the effort including purpose, who is involved, and how scenario planning could be used.