

Group 1- Applying a Scenario Planning Approach Planning for Operational Responses to Extreme Events

Introduction

A large metropolitan region in the U.S. has experienced several major catastrophic weather events with major transportation impacts in the past year. The events resulted in deaths or injuries, stranded travelers, and limited emergency vehicle access. Transportation officials were criticized by the public and elected leaders following each event for an inadequate response. As a result, there is a need for transportation operators, planners, and their regional partners to develop strategic plan for improving the transportation response to extreme weather events including identifying desired levels of performance. A scenario planning approach will be used to help ask the 'what if' questions concerning extreme events, identify and agree upon operations objectives, performance measures, and strategies for improved transportation management and operations.

It should be noted that this mock exercise will only address one type of weather event, however this process could be repeated to test the results against additional extreme events including a bridge collapse, a major hurricane, etc.

Event 1: Snow Storm in a Southern City¹

The icy weather wreaked havoc on Tuesday across much of the region, closing schools and highways, grounding flights and contributing to at least a dozen deaths from traffic accidents. Flurries began before noon Tuesday. Ice soon followed. Schools, businesses and government offices closed early -- and at nearly the same time. In less than an hour, traffic went from 20 mph to a standstill. Salt and sand trucks could not get through to treat the roads. Thousands of people stranded overnight at school, at work or in their cars began getting home Wednesday as ice melted from highways and crews cleared roads littered with wrecked and abandoned vehicles.

Phase 1 - Defining the problem, the approach and the stakeholders

Begin by discussing and developing answers to the questions below.

- Given the descriptions of the events, what are the key issues that need to be resolved?
- Who are the stakeholders that we should engage in the conversation?
- What do we want the outcomes of this process to be?

Phase 2 – Where are we now and where are some emerging trends that could create a repeat of extreme events?

- What are indications of our current performance during emergency events?
- If we continue "business as usual" what will likely happen in the future?
- What other conditions or measures do we want/need to know about?

¹Excerpts and adapted portions with some details changed were taken from CBS News *Road to nowhere: Minor snowstorm brings Atlanta to standstill*. Available at: <http://www.cbsnews.com/news/atlanta-other-parts-of-south-paralyzed-by-ice-snowstorm/>.

Phase 3 – Where do we want to go?

At this phase in the process, start by identifying some different goals and performance objectives for managing the transportation system during an extreme event. Consider the core community values and build from there. Also consider the views of stakeholders not represented in your group such as the general public and emergency management.

- What might the primary goal(s) be?
- What are some of the M&O objectives?
- What are the measures for these objectives?

Phase 4 – What are some scenarios or ways that we can get to where we want to go?

It is during this phase that scenarios are developed. Each scenario is driven by the set of M&O goals and objectives developed in Phase 3. The scenario could be developed from the point of view of a transportation user or a newspaper reporter relating how improved transportation operations and management during this type of event was experienced (i.e., truck drivers saw notification of the snow storm several counties away and were able to avoid getting stranded; coordination with major employers occurred and workers were told to stay home).

From each scenario, develop a set of M&O strategies. For each of the scenarios, identify the different strategies to help achieve the stated goals and objectives. Of note, the focus should be on M&O strategies for each, but do not limit the discussion only to M&O. Think about how the M&O strategies can work in concert with other efforts to better manage responses to or resiliency for extreme weather events. Example scenarios might include:

Scenario 1: “Maximize Safety with Limited Budgets.” In this environment there are limited additional funds available to address improved outcomes under extreme events. Therefore the emphasis is on pre-planning to reposition existing assets, operations and management systems as much as possible and come up with a shorter term set of strategies that emphasis safety (next 6-18 months).

- *Strategies for this scenario would include a combination of communication strategies to reduce travel demand; keep travelers and residents informed of extreme conditions; and developing a corridor prioritization strategy to target limited emergency and road clearing resources.*

Scenario 2: “Maximize System Resiliency and Reduce Economic Impacts.” This scenario would seek to restore system to safe operating conditions as quickly as possible to enable freight and goods movement, job access, etc.

- *Strategies to support this scenario could include doubling resources for snow clearing; limiting access to roads; real-time information on unsafe locations and crashes to mobile devices; high end emergency rescue infrastructure; robust traveler information systems and use of traffic controls; etc.*

Scenario 3: “Maximize Safety.” This scenario would seek to reduce the total number of travelers on the road prior to/during and immediately following the event. This scenario is focused on reducing demand for travel during extreme weather conditions.

- *Strategies to support this scenario could include: coordinated pre-planning efforts to encourage daily travelers to stay home (schools and employers); intrastate and media coordination to reach freight and goods interests; pre-storm road closures; etc.*

Phase 5 – What are the impacts and how do the scenarios perform?

This step allows participants to compare and discuss how each set of M&O strategies might perform in response to extreme events. Based on current conditions, hypothesize how each might perform. Make assumptions where necessary.

- In order to measure the impacts, what specific data, tools or models might be needed to evaluate and compare the scenarios?
- What are the qualitative and quantitative measures we can compare?
- Based on these comparisons, are there certain strategies that perform well across all scenarios? What do these evaluations tell us about the benefit costs of achieving our desired goals and objectives?

Phase 6 – What is our preferred scenario or path forward?

Based on the scenario evaluations, is there consensus on which goals, objectives and measures really matter most? Are there bundles of strategies that work well in supporting multiple objectives? Try and reach consensus on a single set of performance goals and objectives relative from which you can develop a strategic action plan.

Develop a plan of action for putting the M&O strategies in place including responsibilities, any new policies needed, and phased approach to implementing the strategies over time.

Group 2: Applying a Scenario Planning Approach to Develop Key Elements of a Corridor Operations Plan

Introduction

Corridor X is a six lane arterial that parallels a major highway (just two miles away) and is dominated by older shopping centers, fast food restaurants and some older two-story office buildings. It serves as one of the main corridors connecting several residential neighborhoods to shopping destinations, and also provides a link into the traditional downtown commercial business district and the region's major job center about 10 miles away. The regional economy is strong and there are mounting pressures to redevelop and infill along this corridor at slightly higher densities. Local community members welcome this new development, but are uncertain about the ultimate form it should take (how much density, what is the balance of jobs and housing, etc.) and what that means relative to environmental impacts and transportation choices (how multimodal will the corridor be?). There is community pushback to not add any additional lanes for traffic due to concerns about encouraging more auto travel and increasing GHG emissions. As such, there is also an interest in increasing transit service and more non-motorized travel along the corridor, and making the areas of infill and redevelopment along the arterial more walkable.

The corridor currently experiences congestion during the rush hour peak periods, and often times on Saturdays. Traffic volumes are predicted to worsen slightly along this 8-mile stretch just with increases in regional through traffic, and current forecasts do not account for the desired infill and redevelopment in the corridor. The corridor is served by a fixed route bus service which connects to the downtown job center. The transit service operates at 30 minute headways, with stops about every three quarters of a mile. The scenario planning exercise aims to look at different visions for how the corridor might evolve overtime and identify the M&O goals, objectives and strategies that can best support a preferred vision. The desired outcome for the scenario planning process is to help participants reach consensus on a preferred vision for the corridor and develop the framework for the creation of a Corridor Operations Plan to help achieve that vision.

Phase 1 - Defining the problem, the approach and the stakeholders

Begin by discussing and developing answers to the following questions:

- Given the context of the corridor, what are the key issues that need to be resolved prior to beginning to identify M&O goals and objectives? Are there competing community values, and if so what might they be?
- Who are the stakeholders that we should engage in the conversation?
- What do we want the outcomes of this process to be?

Phase 2 – Where are we now and where are the trends likely taking us?

What are the current conditions on the corridor today, what are they likely to be in the future? Information is supplied below to help answer this question.

- Six lane arterial road with center median, 55,000 daily traffic; 4,950 peak hour; 2,970 peak direction
- Volumes projected to increase to 60,000 day – increase predominantly from regional through traffic
- 8 intersections; 1 major cross street with similar volumes
- Buses about 0.8 miles apart – no bus bays
- Interconnected signal system; Signal timing plans – not updated in 5+ years
- Stretches along the corridor where there are access management challenges
- Existing strip commercial getting abandoned; property values stagnating but regional growth pressures attracting redevelopment prospectors

What other conditions or measures do we want/need to know about?

Phase 3 – Where do we want to go?

In this case study, there are some different notions about how this corridor might develop in the future, but there are some common goals related to economic development and the environment. For example, some of the economic development goals, objectives and measures might include – increment of increased tax revenue return based on different corridor development options; total number of people located within 25 minute commute of new job center or CBD. Environmental goals, objectives and measures could include reduced VMT and associated GHG's. Therefore this phase will be critical in trying to identify specific M&O objectives that reflect those common goals from which different scenarios can be developed to support tradeoff discussions.

- What are some of the M&O goals and objectives?
- What are the measures for these objectives?

This discussion of goals, objectives and measures is a critical step in the process as it prompts participants to:

Phase 4 – What are some scenarios or ways that we can get to where we want to go?

It is during this phase that scenarios are developed. Each scenario is driven by a distinct vision, and set of M&O goals and objectives. From these goals and objectives, a set of M&O strategies are developed. Of note, the focus should be on M&O strategies for each, but do not limit the discussion only to M&O. Think about how the M&O strategies can work in concert with other efforts (such as geometric design considerations for access management; land use and urban design strategies to support different modal options; etc.).

- Vision A – Corridor redevelops; new major job center in corridor, and some shifting to more transit use occurring
- Vision B – Corridor redevelops; more infill residential with patterns and preferences for more transportation choices for commuting into the center city and making daily trips
- Vision C – Corridor stabilizes with new investment but same mix of use and densities; development patterns remain auto-centric

For each of the visions or scenarios stated above, what are the different strategies to help achieve the stated goals and objectives?

Phase 5 – What are the impacts and how do the scenarios perform?

This phase allows participants to compare and discuss the tradeoffs associated with the different development patterns and transportation strategies. Based on the information provided in Phase 2, hypothesize on how the three scenarios might perform relative to the different M&O strategies proposed or applied.

- In order to measure the impacts, what specific data, tools or models might be needed to evaluate and compare the scenarios?
- What are the qualitative and quantitative measures we can compare?
- How do the different M&O strategies support the different community goals?
- Based on these comparisons, are there certain M&O strategies that perform well across all scenarios?
- What do these evaluations tell us about the benefit costs of achieving our desired goals and objectives?

Phase 6 – What is our preferred scenario?

Based on the scenario evaluations, is there some new consensus on which goals, objectives and measures really matter most?

If there is consensus, how can you take the results of the scenario process and refine the goals, objectives and strategies to develop the Corridor Operations Plan?

If there isn't consensus on the long term corridor vision, what is the right M&O planning response?

Group 3- Using Scenario Planning to Explore Issues and Opportunities for Advancing Connected Vehicle Technologies in a Downtown Setting

Introduction

A busy downtown central business district experiences significant peak hour congestion, pedestrian vehicle conflicts and parking shortages. The city would like to explore how Connected and Autonomous Vehicle (CAV) technologies could change these dynamics in downtown to improve pedestrian safety, alleviate congestion hot spots and reduce parking demand. A scenario planning approach will be used to help ask the 'what if' questions concerning autonomous and connected vehicle deployment, identify some near term connected vehicle technology infrastructure needs and help a wide range of stakeholders better understand the long term issues and opportunities associated with increasing use of connected and autonomous vehicles and how they might help to address community goals.

Phase 1 - Defining the problem, the approach and the stakeholders

Begin by discussing and developing answers to the questions below.

- Given the description of the downtown challenges, what are the key issues that need to be addressed?
- Who are the stakeholders that we should engage in the conversation?
- What do we want the outcomes of this process to be?

Phase 2 – Where are we now and where is the technology going?

- How is the current downtown system performing? What are some of the near term and long term technology advancements that we should be considering? What does the community value most?
- If we continue “business as usual” what will likely happen in the future?
- What other conditions or measures do we want/need to know about?

Phase 3 – Where do we want to go?

At this phase in the process, start by identifying some different goals and performance objectives for improving conditions in downtown. Consider the core community values and stakeholder insights and build from there.

- What might the primary goal(s) be?
- What are some of the objectives?
- What are the measures for these objectives?

Phase 4 – What are some scenarios or ways that we can get to where we want to go?

It is during this phase that scenarios are developed. Each scenario is driven by goals and objectives developed in Phase 3. The scenario could be developed from the point of view of a transportation user or a newspaper reporter relating how new CAV technologies have transformed downtown. For each scenario, identify some specific CAV technology infrastructure that may be needed (type, location, etc.); think about the percentage of CAV enabled vehicles and potential impacts on travel demand; make some assumptions for each scenario to enable comparisons. Some example scenarios could include:

Scenario 1: “Autonomous Vehicles Reign.” In this scenario, more than 50% of the vehicles on the road are enabled with driverless technology. Therefore this impacts parking demand – enabling drivers to be ‘dropped off by their cars’ and the cars can park outside of downtown reducing parking demand but potentially increasing VMT; all major streets, intersections are enabled with CV technologies to improve traffic flow during peak hours and improve pedestrian safety.

- *Strategies for this scenario would include identifying the ITS/IT infrastructure needed on city streets to support CV communications; may also include identification of new ‘parking’ zones or lots located outside of downtown; could also include emphasis on increased carpooling for driverless vehicles. What other strategies come to mind?*

Scenario 2: “The Walls Can Talk.” This scenario assumes that all cars, trucks and transit vehicles on the road have CV technologies relative to advanced warnings, rerouting (think automated ‘waze’ like technologies), adjacent car detections, etc. While all vehicles still require drivers, each vehicle is able to communicate with others and the traffic system as a whole.

- *Strategies to support this scenario could include significantly increasing ITS/IT infrastructure needed on city streets (including: curb speed warnings, ITS signal prioritization, signalized crosswalks, mobile enabled pedestrian signals, probe enabled traffic monitoring, etc.); investing in advanced CAV technologies for transit system, etc. What other strategies come to mind?*

Scenario 3: “Connected Corridors.” This scenario focuses entirely on selected corridors within downtown to maximize CAV technologies to improve flow for transit vehicles and autos and reduce pedestrian/vehicle conflicts.

- *Strategies to support this scenario could look very similar to scenario two but focused only on select corridors similar to deployment plan highlighted in THEA example: curb speed warnings, ITS signal prioritization, signalized crosswalks, mobile enabled pedestrian signals, probe enabled traffic monitoring, etc.*

Phase 5 – What are the impacts and how do the scenarios perform?

This step allows participants to compare and discuss how each scenario might perform relative to key goals and objectives. It will also illuminate what is possible in the near term/long term relative to the current state of CAV technology. It may also instigate longer term discussions about land use and parking policies in downtown based on changing traveler behavior/travel demand. Based on current conditions, hypothesize how each might perform. This step will also be critical in helping to identify the ‘hard’ and ‘soft’ IT infrastructure needs that might be needed to support each scenario. For exercise purposes, make assumptions to help encourage the comparisons/what ifs.

- In order to measure the impacts, what specific data, tools or models might be needed to evaluate and compare the scenarios?
- What are the qualitative and quantitative measures we can compare?
- Based on these comparisons, are there certain strategies that perform well across all scenarios? What does this process tell us about the need to better plan for CAV technologies today?

Phase 6 – What is our path forward?

Based on the scenario evaluations, how might we change our current traffic management strategies for downtown? What additional stakeholders do we need in the room to maximize the opportunities associated with increased CV technologies in our region? Are there specific strategies we can start moving forward on now that position downtown well regardless of how quickly CAV technology advances in privately owned vehicles?

Develop a plan of action for putting some new plans, policies and strategies in place to maximize the potential benefits of CAV in improving downtown travel conditions for all modes.