Rapid Policy Analysis Tool (RPAT)

VisionEval Peer Exchange Meeting Summary

November 30, 2018

Contents

Definitions

AASHTO	American Association of State Highway and Transportation Officials
ARC	Atlanta Regional Council
AV	autonomous vehicle
CAMPO	See Footnote1
CAV	connected autonomous vehicle
CDTC	Capital District Transportation Committee
DOT	Department of Transportation
EERPAT	Energy and Emissions Reduction Policy Analysis Tool
FHWA	Federal Highway Administration
GHG	greenhouse gas
GreenSTEP	Greenhouse gas Strategic Transportation Energy Planning
GUI	graphical user interface
MPO	Metropolitan Planning Organization
ODOT	Oregon Department of Transportation
RPAT	Rapid Policy Analysis Tool
RSPM	Regional Strategic Planning Model
SHRP2	Second Strategic Highway Research Program
STS	Statewide Strategy
TDM	Transportation Demand Model
TNC	Transportation Network Company
VERPAT	VisionEval Rapid Policy Analysis Tool

[1] Several MPOs use the acronym CAMPO, including the North Carolina Capital Area Metropolitan Planning Organization and the Corvallis Area Metropolitan Planning Organization.

Peer Exchange Meeting Purpose

AASHTO sponsored a peer exchange intended to share lessons learned from VisionEval. The meeting was held on Tuesday, September 25, 2018, from 8:00 a.m. to 2:00 p.m., at the Association of Metropolitan Planning Organizations (AMPO) Annual Meeting in San Antonio, Texas. The agencies represented in the peer exchange discussed the wide range of intended uses for VisionEval and their varied experiences using the software. The participants in the peer exchange discussed aspects of their VisionEval implementation, its purposes and intended uses, results from using RPAT, and the problems and limitations encountered during their implementation process.

The session was conducted in three parts:

1. Presentations on implementation topics by the participants including data preparation, outcome and interpretation of results, use of results in policy discussions, and model validation.
2. Presentation of the common framework concept for the family of scenario planning models including RPAT, Federal Highway Administration's (FHWA's) Energy and Emissions Reduction Policy Analysis Tool (EERPAT), and Oregon's Greenhouse Gas Strategic Transportation Energy Planning (GreenSTEP) model.
3. Roundtable discussion on possible enhancements to VisionEval.

This document provides a summary of the peer exchange proceedings.

Welcome, Introduction, and Agenda Review

Matt Hardy, AASHTO Program Director for Planning and Policy, welcomed peer exchange meeting participants. This meeting is the culmination of several phases of work sponsored through SHRP2 with support from the FHWA, AASHTO, and the Oregon Department of Transportation (ODOT).

Matt reviewed the meeting agenda and invited participants to introduce themselves and describe their experiences with VisionEval. Participant experiences were varied; many participants have experience with strategic planning and have followed the evolution of VisionEval while others have no previous experience with the tool and are interested in learning more.

Overview of VisionEval

Maren Outwater, a consultant with RSG, provided an overview of VisionEval and described how agencies can use strategic planning models to support long-range planning. VisionEval is a newly established open-source tool designed to combine several strategic planning tools and models into a common programming framework. The goal is to support application of the tools across a broad array of planning contexts by developing a supportive community to refine and enhance the suite of tools.

There are three types of models: tactical, operational, and strategic planning. These types of models were developed to address future gaps and issues identified by agencies. They are built on the understanding that there is uncertainty about the future. These models help planners better understand uncertain futures to inform policy development. Strategic modeling can occur ahead of project identification to identify policies that can be successfully applied to a range of potential futures.

VisionEval is built on the following four models: GreenSTEP, EERPAT, Regional Strategic Planning Model (RSPM), and RPAT. GreenSTEP and EERPAT are designed for statewide analysis while RSPM and RPAT are designed for regional contexts.

VisionEval combines these four models and provides users with more flexibility around scale and focus. The scope of the tools includes a Transportation Demand Model, pricing, emissions reductions, land use policies, and considerations for emerging technologies such as autonomous vehicles (AVs). Initially, the models focused narrowly on environmental impacts, but have now expanded to include a broad range of considerations. The strategic model can inform travel demand models later in the planning process. More information about each model is linked as follows:

- VisionEval: https://gregorbj.github.io/VisionEval/
- GreenSTEP: https://www.oregon.gov/ODOT/Planning/Documents/GreenSTEP-Scenario-Planning.pdf
- RSPM: https://www.oregon.gov/ODOT/Planning/Documents/RSPM_OMIP_Summary.pdf
- EERPAT: https://www.planning.dot.gov/fhwa_tool/default.aspx
- RPAT: https://planningtools.transportation.org/551/rapid-policy-analysis-tool.html

Discussion

Q: Are these tools appropriate for small MPOs?

A: These tools are appropriate for small MPOs because the models are disaggregated.

Q: What are the outputs that the model provides?
A: We suggest that you provide assumptions in travel demand models as opposed to outputs. There are zones (roughly equivalent to block groups) that are geographically oriented.

Q: How quickly does the model run?
A: Run times can vary from a few minutes to a few hours.

State of VisionEval

Jeremy Raw, FHWA Community Planner, provided an overview of the state of the VisionEval tool including the genesis of the tool and pooled fund, current membership, and work priorities. VisionEval advances prior GreenSTEP models, including RPAT. SHRP2 sponsored development of the models, but this funding source is coming to an end. To continue this work, AASHTO and FHWA are transitioning governance to a consortium of users and a pooled fund was established to continue the consolidation of models into VisionEval. The pooled fund includes a project budget of approximately $780,000 (K) through 2020. Work priorities include improving access to the tool, enhancing functionality, and improving development processes. Pooled fund partners include:

- California Department of Transportation
- Maryland State Highway Administration
- North Carolina Department of Transportation
- Ohio Department of Transportation
- Oregon Department of Transportation
- Virginia Department of Transportation
- Washington Department of Transportation
- Atlanta Regional Council
- Houston-Galveston Area Council
- Regional Transportation Commission of Southern Nevada

Discussion

Q: How can MPOs get involved?
A: The pooled fund group will be working to deploy, validate, and refine the tool and will be conducting outreach to agencies to ensure its functionality in planning processes. You can visit VisionEval.org to learn more.

Q: What is the structure of the pooled fund?

A: FHWA is the lead agency for the pooled fund. State DOTs contribute $25K and MPOs contribute $15K a year over 3 years. In addition to funding, FHWA will contribute staff and other resources. FHWA is responsible for coordinating work as part of the pooled fund. Visit https://pooledfund.org/Details/Study/621 for more information including quarterly reports and updates.

Case Study 1: Reducing Greenhouse Gas Emissions and Planning for the Regional Land Use Vision

Chris O'Neill, Capital District Transportation Committee (CDTC) Principal Transportation Planner, described how the MPO used performance-based and scenario planning to inform the development of their regional, long-range plan New Visions 2040. The CDTC is the MPO for the Albany, Schenectady, Troy, and Saratoga metropolitan areas.

Early in the planning process, CDTC identified the importance of reducing regional GHG emissions and used the VisionEval Rapid Policy Analysis Tool (VERPAT) to inform the development of the plan. CDTC partnered with the New York State Energy Research and Development Authority and the Ithaca Tompkins County Transportation Council to support this work.

CDTC identified several goals and objectives to support regional reductions of GHGs, including equitably investing federal transportation funds, managing congestion while limiting roadway widening, and emphasizing system reliability through management and operations. These goals and objectives were paired with land use planning and studies to encourage development patterns that support these transportation objectives.

CDTC used a merit-based process to evaluate projects according to performance measures during their transportation improvement planning process. Performance measures included community quality of life, safety, reliability, access, bridge and pavement condition, air quality, and GHG emissions.

CDTC tested various scenarios with the VERPAT model, including:

- Status quo land use and development trends and patterns
- Connected automated vehicles (CAVs) and AVs contribute to increased sprawl
- Mobility as a Service (MaaS)and CAV technologies encourage urban reinvestment
- Electric vehicle use accelerates
- EV adoption is slower than anticipated

- Pricing options such as a carbon tax

Chris reviewed scenario inputs for bicycling, demand management, land use, transit, and vehicle travel cost that the project team used to evaluate the scenarios. For each input they considered a range of assumptions from positive outcomes (for example, concentrated development in the urban core) to negative outcomes (for example, urban sprawl increases).

The preliminary findings of model indicate that extreme assumptions about land use patterns seem to produce relatively minor changes in GHG emissions because population and employment growth are relatively slow in the region. In contrast, safety impacts are sensitive to changes in the scenario input levels. Scenarios that test policies designed to expand the electric vehicle market will be examined to evaluate impacts to GHG emissions.

CDTC will use the VERPAT model to refine the scenarios and then examine different scenario outcomes for various horizon years (for example, 2030 and 2050). The results will be used to explore levels of support for policies and actions to be incorporated into the New Visions Plan update.

Discussion

Q: How likely is that CDTC will attain the goals in the New Visions 2040 Plan?

A: The goals are realistic but not guaranteed. We want to keep pursuing these goals in the face of uncertainty. AVs present a great amount of uncertainty for the future and make it difficult to model.

***Q**: How have local communities participated in the regional planning efforts?*

A: CDTC conducted 88 studies across 40 communities and a lot of communities have engaged the program.

Q: Did the MPO consider environmental justice and equity issues in the long-range planning effort?

A: The MPO has developed policies to address environmental justice and convened an equity task force to address issues of equity.

Q: Can users see the relationship between assumptions and scenarios?

A: The tool is open-source and users can make changes to inputs and assumptions based on local characteristics. However, it would be more useful if displays were designed for a less technical audience.

Q: How are you addressing congestion?

A: CDTC prioritized reliability and nonrecurring congestion over recurring congestion.

Case Study 2: ARC Connected Autonomous Vehicle Application

Kyung-Hwa Kim, Performance Analysis and Monitoring Manager with the Atlanta Regional Council (ARC), reviewed scenario planning work conducted by the MPO. Advancements in technology are occurring on an accelerated trend and as a result present a great deal of uncertainty for long-range planning among local, regional, and state agencies. Given this uncertainty, agencies can apply performance-based planning to guide policy and investment decisions. Performance and planning are connected and inform each other.

ARC developed tools to address different aspects of planning, incorporating lots of different data from a variety of sources. However, these tools did not address the uncertain future. Planners need a different perspective on planning processes. The paradigm needs to shift from a fixed future to an uncertain future. Exploratory scenario planning allows planners and transportation professionals to look at current and projected issues from multiple perspectives supporting the development of dynamic and resilient plans.

ARC used RSPM instead of a travel demand model because it provides for more flexibility and users can change variables as needed. ARC was one of five regions selected by a National Cooperative Highway Research Program, Impacts 2050 Scenarios, to analyze impacts from disruptive socioeconomic changes to travel patterns. The project identified drivers of change for the Atlanta region.

ARC used this experience to inform the development of its regional, long-range plan and to visualize and communicate to the public about the lessons gleaned from these tools. ARC created a visualization tool for the public to interact with and better understand the range of scenarios. The tool is educational in focus and can help the public understand the complexity of the relationships between inputs and understand that the future is complex and uncertain.

Discussion

Q: How do you address the differences between sketch planning tools and models designed to evaluate projects?

A: Models and tools should be used in combination to understand policy and project impacts. ARC combined model results with robust qualitative analysis and stakeholder engagement to address the future uncertainty and communicate about their process. Strategic models can help planners better understand the assumptions to be included in travel demand models.

Case Study 3: Monitoring ODOT's Statewide Transportation Strategy for Greenhouse Gas Reduction

Tara Weidner, ODOT Transportation Planning Analyst, reviewed how Oregon developed a Statewide Strategy (STS) for GHG reduction. The Oregon State Legislature mandated that ODOT reduce transportation-related GHGs by 2050. ODOT's STS visioning process identified a range of assumptions to identify what it would take to reduce transportation GHG emissions by 2050. The scenarios included a range of assumptions addressing land use, pricing, mode shift, fuel and vehicle efficiency, and system operations and management.

ODOT developed GreenSTEP to assist in the identification of strategies to reduce GHG emissions from light-duty vehicles. GreenSTEP models the effects of many different factors (for example, transportation supply, prices, and land use) on household vehicle ownership and use, emissions, and congestion.

Oregon's STS included strategies around vehicles and fuels, systems and operations, pricing, transportation options, and land use. Transportation accounts for approximately 30 percent of GHG emissions in Oregon and the STS vision achieves a 60 percent reduction in GHG emissions from 1990 levels. ODOT developed an implementation plan that included assisting MPOs with scenario planning and monitoring and reporting on implementation progress. So far, Oregon is on track in the near term, but there are gaps to achieving the STS vision, chief among them the need to address transportation demand.

Discussion

Q: It seems that there is a benefit to using these tools to educate decision makers and the public about the tradeoffs associated with various policies and investments. It seems that it would be useful to capture gaps in revenue and needs.

A: The model can capture gaps between revenue and costs to operate and maintain current infrastructure.

Q: How does the model address conflicting policies?

A: Users can choose how to frame the conversation around the model and decision making based on what is technically and politically feasible.

Q: Is there flexibility in the model to capture variations in different revenue streams for different planning contexts (for example, Texas vs. Oregon)?

A: This could be possible in the future iterations, but this model is more focused on evaluating tradeoffs and does not yet capture different funding sources.

Ongoing Work Report and Input

Ben Stabler, a consultant with RSG, provided an overview of the work that has been completed to develop multiple scenario analysis functionality, scenario viewer integration, a new user tutorial, and the addition of electric vehicles to VERPAT.

VisionEval consists of the following components:

- Framework – software collaboration standards
- Test system – ensures contributions work
- VERSPM – RSPM model (zonal resolution)
- VERPAT – RPAT model (regional resolution)
- VEState – GreenSTEP model (state resolution)
- VEGUI – user interface for running VisionEval models
- VEScenarioViewer – interactive analysis of results

The new VEScenarios package includes a multiple scenario builder, runs scenarios outside the GUI in parallel, gathers results from the multiple scenarios, and generates the scenario viewer data file. The scenario viewer aggregates the results across scenarios into tabular form and users can interactively explore the relationships between inputs and outputs with the web-based data visualization dashboard.

The new user tutorial includes a brief introduction to scenario planning, a description of the VERPAT model, instructions on installing and running the model, and guidance on how to setup and run multiple scenarios. More information can be found at: https://github.com/gregorbj/VisionEval/wiki/VERPAT-Tutorial-Overview.

Brian Gregor highlighted key features of VisionEval to expand the modeling capabilities. Three concepts that make it a scalable and expandable tool are modularity, open science approach, and built-in model and data checking.

VE-RSPM will be expanded to include VE-State, multimodal travel module, and Transportation Network Companies (TNCs) and AVs:

- VE-State will reimplement GreenSTEP and EERPAT models but with less detailed zone geography than RSPM. Zone synthesis can substitute for detailed zone inputs.
- Multimodal travel model is more sensitive to land use variables and adds prediction of alternative mode trips and PMT.

- TNC and AVs needs to address substitution of TNC use for vehicle ownership and effects on travel budget, speed, and travel behavior. VE-RSPM includes car-service substitution and budget effects.

VE-State is under development and the project team completed testing of the VE-RSPM modules with multiple zones and areas (i.e., counties and metropolitan areas, respectively). The team is developing a land use package to synthesize zone characteristics and then will conduct a full-scale test with Oregon data.

Maren Outwater of RSG provided an overview of EERPAT. EERPAT is now in its fourth iteration and recent improvements focused on user interface, freight module, and emissions. EERPAT focuses on trucks and the pickup and delivery system is not included in the model. The model addresses high-priority policies including fuels and vehicles, driving characteristics (for example, ecodriving and CAVs), economic growth, and mode shift. The tool was developed in the Federal Office of Environment and GreenSTEP was used to guide development. FHWA is suggesting that EERPAT be included with VisionEval.

Discussion

Q: How does it address ports?

A: It assigns a certain amount of tonnage going through the port and then calculates vehicle miles traveled for trucks from ports and other sources.

Takeaways and Lessons

Kristin Hull facilitated a group discussion to identify how participants envisioned using VisionEval. The following list was established:

- Educate the public to better understand outcomes and tradeoffs related to values.
- Help set targets for performance measures. This use is particularly salient as agencies need to gather a large amount of data to set targets. VisionEval can help frame targets by understanding more realistic outcomes related to policies.
- Conduct strategic assessment of policies as part of a regional transportation plan to support informed decision making.
- Engage nontechnical groups through the viewer as a critical step to informing decision making.
- Better understand policy levers to improve transit ridership.
- Use iteratively to first identify the levers with the highest potential and then investigate what it would take to get there.

Would participants use this tool themselves or direct staff to use the tool? What do we need to do to improve the usability of the tool?

- Communicate effectively about the tool and engage the public and decision makers. It could be useful to include considerations regarding asset management in the tool because this drives so much of our investment.
- Address issues with downloading the tool for public agencies.
  - Some agencies have had issues installing the tool.
  - It could be useful if the tool was cloud-based.
  - It would be helpful to have a certification letter verifying the tool and that it is ok to download.
- Create clearer documentation of who the experts are and who the resources are to understand the inner workings of the tool.
- Develop a rural application.
- Create training videos.
- Update the user guide to include information on how to calibrate the model and provide a typology for land use or place types.
- Clearly document the process and the tool and how to use the tool so that mid to large MPOs can use the tool without hiring a consultant.

Participants closed with questions about the tool:

- How long would it take for a planner to understand how to use the tool?
  - It took about 6 to 9 months for ODOT staff to learn the model with GreenSTEP.
  - Setting up the model can take about 1 to 2 months. When it is combined in a planning process it can take longer.
- What is the calibration process for the model?
  - Calibration can take about 2 months for planners.
- Are there sensitivities in the model to account for investment in transit?
  - Yes, there are two elements: overall service level in region and accessibility service at a zonal level. The model updates will account for shared mobility options and was designed to be modular, so it can be adapted to fit different contexts.

Matt thanked participants for attending. SHRP2 features three tools: Plan Works, Travel Works, Econ Works. You can download RPAT to use a tool and the pooled fund project will carry the work forward to further improve the model.