EXPERTS TALK

Transportation Systems Management and Operations

What to Do When You Can't Buy or Build Your Way into Operational Efficiency

With increasingly tight transportation budgets and less land available, simply adding lanes isn't necessarily the best solution to operational traffic issues, and sometimes it's not even an option. Using the Transportation Systems Management and Operations (TSMO) approach often uncovers more effective or efficient options when planning or modifying transportation systems. By systemically using creative TSMO strategies to improve transportation infrastructure, planners and engineers can find ways to do more with less — and do it smarter.

Matthew Volz, P.E., is a senior transportation project manager in HDR's Kansas City office. He has promoted the use of advanced technologies and operational strategies to improve our transportation system since the mid-90s. His experience includes intelligent transportation systems and TSMO planning, design and education projects across the country as well as internationally in the UAE. In 2019, Volz led a TSMO University education project that went on to win three awards: the National Operations Center of Excellence TSMO Advocacy Award, the ITE Education Committee Best Project Award and the ITE TSMO Council Best Project Award. In this interview, Volz talks about how to use TSMO to find efficient ways to handle transportation problems and inefficiencies. Contact **Volz** for more information on TSMO.

Q. What is TSMO?

A. Transportation Systems Management and Operations, or TSMO for short, is a cross-discipline approach meant to improve existing and planned transportation infrastructure through better integration, coordination and implementation of key operational strategies. The strategies can range from simple techniques like restriping, adding a turn lane or optimizing traffic signal timing to more complex strategies such as managed lanes, mobility hubs, smart work-zones and ITS devices. Put simply, TSMO improves the safety, reliability and operation of the transportation system with lower-cost, high-impact actions that can be implemented relatively quickly.

TSMO strategies are regularly used by transportation agencies, but typically on a stand-alone basis and not

necessarily in an integrated manner or strategically deployed. Agencies can sometimes get singularly focused on capacity expansion options; the traditional project development and procurement processes lend themselves to those options rather than finding ways to optimize overall operations. The TSMO term applies to numerous strategies and actions designed to provide operational improvements to the transportations system. They can improve the existing system or create more efficient new roadways.

Q. Many transportation agencies/infrastructure operators are transforming their operating philosophy to incorporate TSMO. What has driven this paradigm shift?

A. "You can't build your way out of congestion," is something I hear repeatedly from transportation agency CEOs and planners industry wide. And it is true. There are several factors that encourage TSMO integration, including a limited budget available for capacity expansion and capital improvement projects. There simply isn't enough funding to expand transportation infrastructure to meet today's demand, let alone demand predicted for the future. Technology advancements and continued ITS build-out are major drivers in the integration of operations into all aspects of planning and design. Emerging technologies provide more opportunities to operate more efficiently. Employing the TSMO toolbox offers strategies to make sure every dollar is being used as effectively as possible.

It is instructive to look back over the past 30 years to the promise of the Intermodal Surface Transportation Efficiency Act. The profession at that time recognized the potential to gain operational efficiencies by applying technologies but the systems, equipment and institutional knowledge were not up to the task. Over the past 30 years advances in technology applications have begun to be deployed on a much larger basis and many more in our profession are technology savvy.

Putting system reliability ahead of demand requires a culture shift within most public agencies. (That goes for the consultants too!) The people who have experienced the benefits of this approach are already telling their designers that integrating technology and operations into major capital projects is mandatory. I would actually like to see all capital projects go through an operations-based value engineering review to see if certain benefits can be accomplished with simpler, more cost-effective strategies.

Q. How is TSMO different than the traditional transportation operations approach?

A.For the most part, TSMO strategies are not new. Other than the most recent technologies, TSMO is primarily a new approach or way of thinking about system operations. It is repacking our toolbox with a broad range of strategies that can be used in a coordinated manner to achieve system reliability, capacity and safety goals. In the 1990s, TSMO largely referred to ITS devices such as cameras and message boards. As technology has advanced TSMO includes things like 511 systems, congestion pricing and even smartphone apps. Now the TSMO umbrella is VERY broad, and we are looking at transportation systems more holistically and using data to better inform our actions. Management of the system is vital as well and includes better traffic incident management, work zone management and demand management.

Q. What are some examples of TSMO strategies and solutions that aren't part of the conventional thinking about transportation projects?

A. TSMO is anything that improves the operation of the transportation system. It doesn't have to be an expensive or costly project. What the strategies have in common is that they can typically be implemented in a shorter time frame often with fewer environmental impacts, have a higher benefit-to-cost ratio and provide a solution to an operational need or improve operations in general.

For example, Washington State recently estimated it would need to build an additional 450 lane-miles at a cost of over $100 billion to eliminate all congestion. That would necessitate raising the state gas tax by up to $2.50/gallon. That is just not a reality in today's political environment. Instead Washington has implemented a variety of TSMO strategies, or what they term as "Practical Solutions", including congestion pricing, integrated corridor management, better traffic incident management, travel demand management, transit and multimodal options, ITS, etc. Massive expansion was not a realistic option for them, and TSMO strategies gives them other options.

Another example: The Colorado DOT had a project that was going to require major reconstruction of an interchange to meet the geometric needs that traditional designs suggested. A required TSMO review concluded that relatively simple re-striping of lanes would make the interchange operate more efficiently and resulted in much improved operations for a small cost. Doing more with less and doing it smarter is the new business model — we must constantly adapt our thinking or we will get left behind.

Q. Operational needs will likely change as a result of autonomous, connected, electric and shared vehicles. How might TSMO strategies evolve as new tools are added in the toolbox?

A. TSMO strategies will need to adapt over time. For example, perhaps ramp metering will become less important if cars can self-meter. Agencies may also need less personnel doing real-time monitoring if autonomous vehicles lead to fewer crashes and real-time information is broadcast directly to vehicles instead of posted on dynamic message signs. No matter what, data and how we use and interpret the massive amounts of data we are collecting now will drive transportation planning, design and operations in the future.

Inspiration & Advice

Q. What inspired you to focus your career on using technology to optimize transportation systems?

A. I was working as a road designer for the Kansas DOT in the '90s when a new position was created focused on applying technology to the transportation system. I researched ITS (Intelligent Transportation Systems) and knew immediately that is what I wanted to do. It was the ground floor of what I recognized was the future of our business. Fast-forward almost 25 years and I still thoroughly enjoy the ability to apply technology and make our transportation system safer and more efficient. And I learn something new every day.

Q. What advice would you offer to new professionals in surface transportation industries who will be applying these strategies out in the field?

A. Educate yourself. I had a traditional civil engineering background and needed to learn about wireless and fiber optic communications, technology installation techniques, systems engineering, software development, etc. I did this through reading numerous publications, attending training classes, taking university-level courses, working in the field with contractors and learning from peers and mentors. That last part being the most important – find mentors in this industry and constantly seek advice and ask questions. I had many mentors along the way who helped increase my knowledge as well as my professional network.

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