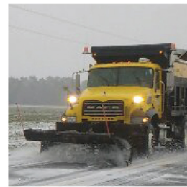
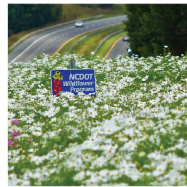




NORTH CAROLINA

Department of Transportation



Barriers to Implementation of TSMO Strategies and Solutions

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Well, there is the Obvious



Historically

Most TSMO projects were parts of larger roadway project

- Last items to be considered
- First thing cut when funds ran low
- Rarely was the larger project in the area of TSMO need

TSMO projects were more of a thing of convenience versus a well thought out plan

Or they were demonstration projects



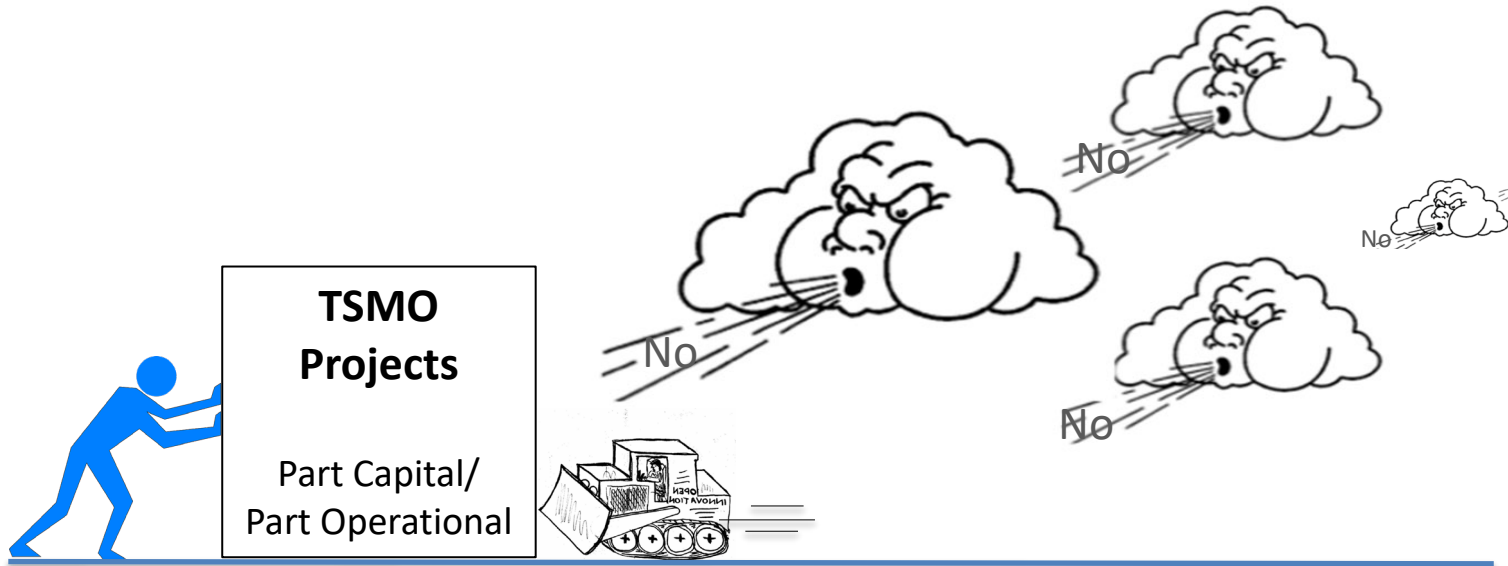
Can TSMO Projects Compete?



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Do these projects have the ability to compete from a cost effectiveness perspective or, are they allowed to compete for funding on their own?

Headwinds and Inertia



It is New and Different



How does that help my budget?



It is not asphalt or concrete



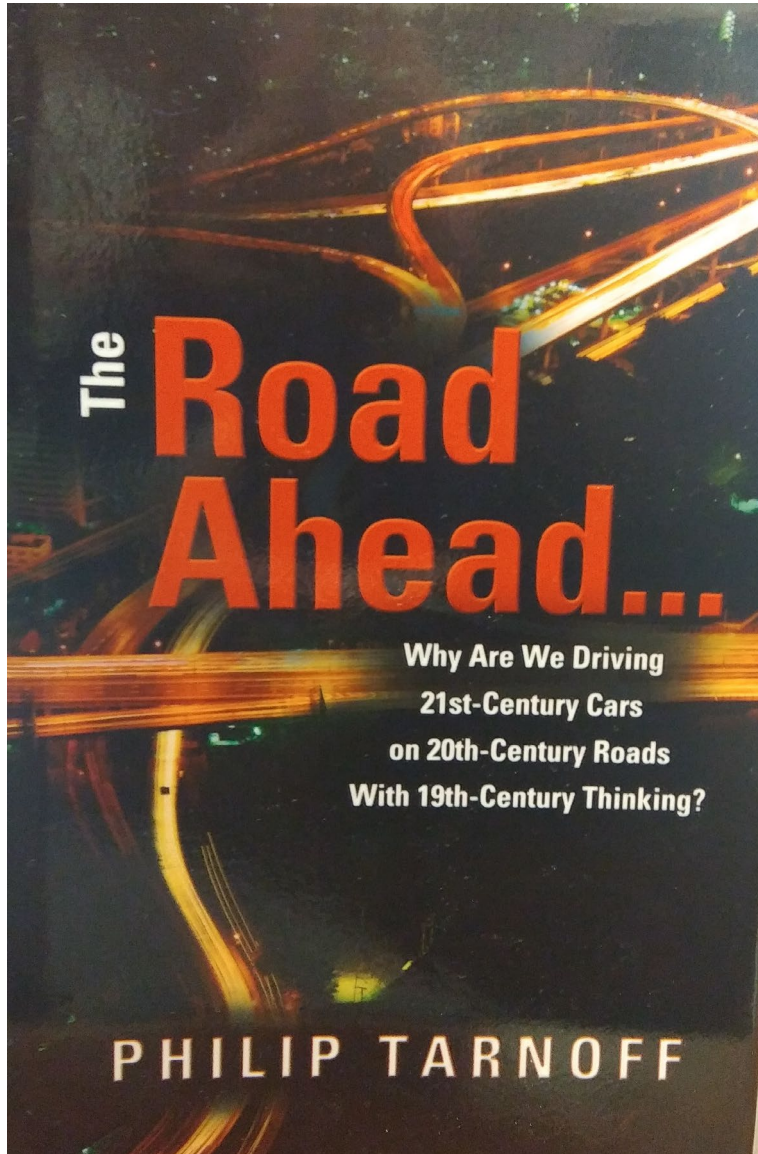
What, there is not a ribbon to cut?



We have been building roads for 100+ years



They are not the normal industry partners...



Asked in 2011:

***Why Are We Driving
21st - Century Cars
on 20th - Century Roads
With 19th - Century Thinking?***

Strategy	Description	Effectiveness
Advanced Vehicle Safety Systems	This is a class of technologies rapidly emerging from the automotive industry that are intended to improve the overall safety of vehicle operations. Examples include back-up warnings, collision warnings, adaptive cruise control, automatic braking systems, lane departure warnings, etc.	Too varied to apply a single value
Automated Enforcement	Primarily includes speed cameras and red-light running cameras which automate the process of issuing violations to motorists exceeding the speed limit or disobeying traffic signal indications, respectively	Reduced right-angle crashes at intersections by as much as 20%
Congestion Pricing	Various called road pricing and value pricing, this strategy permits motorists to utilize a specific facility or urban area for a fee that varies depending on the levels of congestion that exist at the time that the fee is paid.	Congestion pricing in London's central business district reduced congestion by more than 20%
Electronic Payment Systems	Includes all payments made for use of a roadway, parking or transit facility. These systems provide an automated mechanism (such as EZPass) for rapid collection of fees and fares. This is an enabling technology for congestion pricing and certain parking management systems	Not applicable
Commercial Vehicle Management Systems	Multiple technologies are available to facilitate movement of trucks and buses including weigh in motion (which eliminates the need to stop at truck weigh stations), automated inspection processes, on-line registration, etc.	Too varied to apply a single value
Incident Management	Includes the organization, technology and personnel needed for the rapid identification, response, and removal of vehicle incidents.	Reduced delays during incidents by as much as 50%

Strategy	Description	Effectiveness
In-Vehicle Navigation	GPS units purchased either as original equipment or after-market devices to provide motorists with the best route from their present location to a desired destination. Newer units include a feature to include real-time travel times in the calculation of shortest route.	Data not available
Lane Control	Most commonly found as display of green arrows or red X's positioned over individual lanes on freeways and arterials. It is more commonly found in Europe than in the US, where, in addition to being opened and closed, differing speed limits may be posted for individual lanes.	No data available for US lane control systems, although the use of lane controls for drivers on freeways, and the use of reversible lanes with variable materials, obviously has the impact to significantly expand capacity of these facilities in the direction that the extra lane is being added. The European approach has the ability to slow traffic on individual freeway lanes to prevent safety benefits.
Parking Management Systems	Parking management systems are used for two strategies: First they may be used to inform drivers about the availability of parking. Second, they may be used to adjust parking rates as a function of time of day to encourage or discourage the use of specific parking facilities or to encourage the use of transit.	No data is available to evaluate the impact of parking management systems, although their obvious benefits are the reduction in traffic congestion looking for available parking in congested urban areas. One planning study conducted in Pittsburgh, PA concluded that 1/3 of the traffic within the central business district was circulating looking for parking.
Ramp Metering	Restricts the rate at which vehicles enter a freeway in order to maintain free-flowing traffic on the mainline	Travel times improved 22%. Accidents reduced 25%

Some of the saddest tables ever....

Of the 17 strategies outlined, 8 did not have information on effectiveness; 2 additional strategies' effectiveness statements started with "Studies have shown..."

TABLE 4a M&O Strategies

TABLE 4b M&O Strategies-continued

Road Weather Information Systems	Road weather information provided with the intent of improving safety. Systems in use measure visibility, wind, temperature and pavement conditions, and provide information that can be used to alert drivers of potentially unsafe conditions.	No data available
Route Diversion/Corridor Management	Management of traffic flow by influencing motorists' choice of routes is a potentially powerful albeit relatively rare strategy. This strategy is used if a facility is closed due to an incident (crash, construction, weather, etc.). It could also be used (but is not currently) to provide load balancing on parallel facilities, to ensure that all available capacity is utilized to its fullest extent.	Studies have shown that this strategy has the ability to reduce delays by as much as 50% in the event of a long term incident on a major facility, when spare capacity is available on parallel routes.
Traffic Signal Control	The low hanging fruit of the M&O field, improved traffic signal timing offers substantial near term benefits. Additional benefits are possible with more advanced forms of control in which the signal timing is adjusted automatically in response to changing traffic conditions.	Reduced delays by as much as 35%
Traffic Monitoring Systems	Strictly speaking, traffic monitoring is not a stand-alone strategy, but rather it is considered an "enabling technology" that is needed by many other strategies (signal control, ramp metering, route diversion, traveler advisory, etc.). This is the technology that measures traffic flow and travel times on all roadways.	Not applicable since this is not a stand-alone strategy.

STRATEGY	DESCRIPTION	EFFECTIVENESS
Traffic Advisory and Information Systems	This strategy is the collection of techniques used by traffic agencies to communicate with motorists. It includes the sign boards (they are known as variable message signs or dynamic message signs-VMS or DMS), telephone call-in systems, websites, low power highway advisory radio, and connections with the media. One of the most effective traffic advisory systems is the emerging in-vehicle navigation system that comes equipped with the ability to navigate around congested areas.	Some studies have found delay reductions as high as 50%
Variable Speed Limit	For years, traffic engineers have known that the majority of motorists drive at a speed that they consider to be safe under prevailing roadway and traffic conditions. During inclement weather, speeds are often lower than the posted speed limit. During periods of dry pavement, high visibility and light to moderate traffic flows, speeds are often considerably higher than the posted speed limit. With this strategy, variable speed limits would be automatically calculated and posted, so that the regulatory speeds are adjusted to prevailing conditions.	Studies have shown that safety is enhanced when traffic is flowing in a steady unvarying stream, with the great majority of drivers traveling at the same rate.
Work Zone Traffic Management	Work zone traffic management is not a unique strategy, but rather a collection of strategies including traveler advisories, variable speed limits and photo enforcement, all of which are used to regulate the flow of traffic in work zones. In a manner that enhances the safety of the workers and motorists.	Accidents reduced as much as 30%

TABLE 4c M&O Strategies-continued

TABLE 4d M&O Strategies-continued

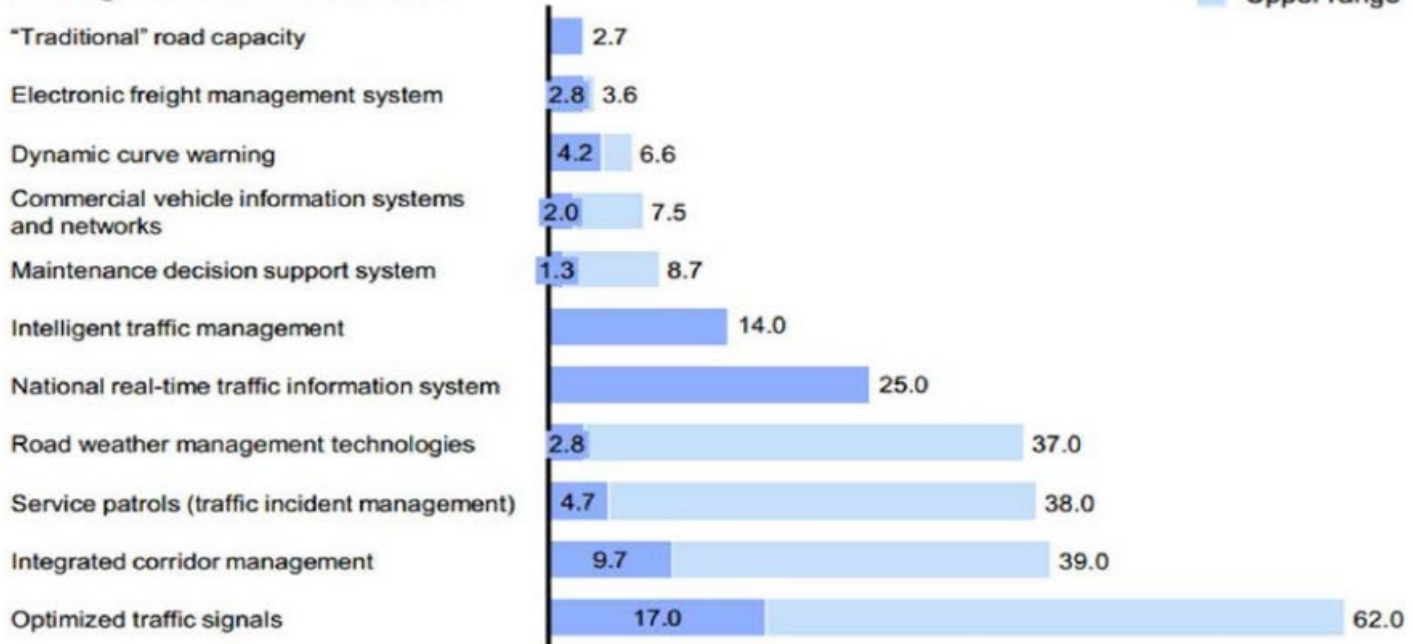
TSMO CAN compete

if there was a competitive process

TSMO Has High B/C

Comparison of returns for different road investments

Average benefit-to-cost ratios



We Have Had Success In Spite of the Challenges

- Strong **Partnerships** with key agencies and industries.
- **Traffic Management Centers** – 3 now, growing a 4th based on need.
- Lots of **cameras** and **message boards**.
- Investment in **communications**.
- Many signal **systems**; we have invested State and Federal Dollars in retiming.
- **Ramp Metering** in place and more coming.
- **Traffic info** services and occasionally take more active **traffic management** roles.
- **IMAP Program** and a thorough training process to allow them to move abandoned vehicles when necessary.
- Advanced **towing** processes.
- **Traffic management during major storms** is far more advanced.
- **Integrated Corridor Management** will be a reality in NC
- And many others...

We Have Visions for much more

How are we going to make the vision a reality?

Be prepared when an opportunity arises

Example: When abandoned vehicles hampered the operations of clearing highways during snowstorms, we were prepared to use IMAP and towing to clear the roads. We have been fortunate to expand this clearance strategy to everyday traffic needs.

Challenge the status quo

Example: North Carolina STI process only allows capital projects to compete. We have challenged this limitation and have significant buy in, just not the right buy in, yet.

Develop measures of effectiveness and demonstrate effectiveness

Example: With the closure of I-40 Business through Winston Salem, the system was less prepared for extended lane closures due to crashes. We set up enhanced incident management process with the local agencies and a dedicated tower to make sure that I-40 proper stayed open to traffic or re-opened as quickly as possible. We developed a dashboard and tracked performance. This was very helpful when we started operations in other areas. The before and after evaluation will show overall effectiveness.

How are we going to make the vision a reality?

Be prepared when something goes wrong

Example: A vehicle was towed, and the owner sued the Department. Be prepared. What enabling legislation allows? Who in the organization will be the face of the problem if it becomes a public issue? Manage all foreseen risks at all stages.

Remove barriers

Example: North Carolina Statutes did not allow NCDOT to initiate a quick clearance action. The law specifically required a law enforcement agency to initiate. We asked the Legislature to revise the law to allow NCDOT to initiate. They approved the change.

Build upon past successes

Example: In the past, there were always questions about the value of IMAP. Using IMAP before, during and after major weather events has nearly eliminated the question of value. It is recognized as a very valuable resource that we need more of, but we are currently unable to overcome funding challenges.

Pick the right fights

Example: Don't argue the value of TSMO against Maintenance if maintenance is underfunded, even if TSMO is underfunded by a larger percentage. Find strategies that benefit both TSMO and Maintenance.

Be stubborn and Hardheaded,
i.e. be a traffic engineer

