

## SESSION #5: PLANNING FOR OPERATING STATEWIDE TRANSPORTATION SYSTEMS IN AN ERA OF SCARCE RESOURCES

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The purpose of this session was to explore the relationship between operations planning and statewide planning and programming. This session illustrated such challenges with examples from different operations-oriented projects.

**STEVEN SMITH, JHK & ASSOCS.**

Let me begin by defining what I mean by operations and operations planning. Operations represent ongoing activities, the day-to-day things that keep passengers and freight moving efficiently and safely. For example, operations could range from toll facilities and the corresponding electronic toll collection to snow/ice removal, although this latter could be argued as being maintenance. Everytime a DOT undertakes a capital project, it assumes responsibilities for operating that facility in a safe and efficient manner. Incident management is certainly another operational responsibility that many DOTs have assumed. Even such things as static signing and road grade striping, actions that traffic engineers typically deal with, but probably don't strike us as an exciting part of operations, still satisfies the basic definition of operations.

As planners, we need to think about how the planning process can help operations occur in an efficient and cost effective manner. With the requirement to have financially constrained state and metropolitan transportation plans, we must think about trade offs like the cost of operations and maintenance (versus initial capital cost) which consumes a large portion of an agency's budget. Planning activities involve some element of operations. So it is not as if planners have never been involved in operations before, but the question is how do planners incorporate these issues into the planning process.

I would like to offer a few principles that should guide the linkage between planning and operations. First of all, operations should influence the choice of projects. When transportation plans and TIPs are being developed, we cannot neglect the cost and benefits of operations. Costs and benefits are more difficult to assess in some cases, such as intelligent transportation systems where we really have very little evidence of what these systems can do for us and what they provide. This also relates to agency image and credibility. For example, a DOT might decide not to get involved in the travel information business because of the need to operationally manage the dissemination of such information with a high degree of

credibility. One of the things we all realize when travel information systems are implemented is that they are often not as well managed as we would like them to be, or they do not give as much information as we would like them to give. When you boil it down to what it takes to develop, manage, and carry out a credible system, it takes a lot of attention. And so, operations becomes an important consideration in agency commitments to implement operations-oriented actions.

Inherent in a commitment to undertake such an action is having relevant staff capabilities. We have to ask ourselves whether our staff deal with these operational issues. Can they run the system?, do they have the expertise?

The second principle is that operability should be integrated into the design concept. Operations is often left as an afterthought. We are finding that when operations is considered in project decisions and design, we have a better project, perhaps a less costly project, and one that has ownership by both the planning and operations community. Just to give you an example, I do not see ITS activities or strategies included in major investment studies. Some might argue the extent to which that should and could occur, but there are a lot of different ways that ITS could become part of such studies. Typically, the ITS-type activities that have been incorporated into the planning study include traveler information systems or ramp metering. This usually represents two or three sentences in a report and does not really provide an integrated approach for project design.

The third principle is that ongoing operational responsibilities should be determined before the project is programmed. If someone is going to be responsible for project operation, that agency or group should know about it. Otherwise, people get handed projects and their willingness to enthusiastically give them priority can be a problem.

The fourth principle is that written operational plans and procedures save time, money, and confusion. I tend to believe that the ITS plans being done around the country are grand plans and concepts, but have not really thought through in sufficient detail how the concepts will work. A new staff person managing ITS actions does not often have a lot of information regarding operational responsibilities. I do not see a lot of coordination between systems operated by local, state governments, and toll authorities. One of the things that ISTEA has done is to bring more players to the collective table, at least for

discussion and coordination of how this takes place. This really is another level beyond where you get to transportation plans and TIPs, but it is one that I believe needs to be given more attention.

The fifth principle mirrors this concept of bringing people to the table—those responsible for operations should be involved in planning. The worst approach is to develop a concept design, and then bring the operations people in, and say “go operate”. If you had paid attention to their concerns and issues the design approach might have been done differently. This has an institutional component to it. In general, experience has shown that facility and service owners will generally be the operators. However, other agencies and groups could play a critical role in making sure the facility works. For example, in incident management, we have police agencies and emergency services which are very much a part of the traffic management activities that go into the overall operation of a facility. DOTs tend to supply a support function in this case. So the challenge is to bring these groups into the project planning process

Traveler information systems need multi-jurisdictional coordination, possibly regional authority or private operation. Traveler information systems span a broad geographic area. People are interested in getting from A to B, and these points do not often fall within individual jurisdictional boundaries. A lot of time is often spent trying to identify the appropriate operators of the system. For traveler information, there is more of a likelihood and need for not only multi-jurisdictional coordination, but also for a more formal arrangement. This involves, in some cases, giving up some responsibility, trusting the other folks to carry it out. Transcom in the New York area and the I-95 Coalition are examples of this process.

What are potential areas for regional, strategic operations planning? By strategic, I mean, in some cases, action that could be more short-term in terms of implementation, but which also involves longer term elements. There are two things that drive the need for strategic operations planning. First, do the issues cross jurisdictional boundaries?; and second, do they cross modes? The following four areas seem to be ones where strategic operations planning is appropriate.

- *Regional traveler information:* I have already mentioned this several times. Traveler information systems involve a multitude of agencies, and certainly covers many transportation modes. They involve DOTs and transit agencies which tend to be regional actors. There is a pretty good argument if you are trying to put together a cohesive regional traveler information system

that you really need to bring all of these activities together under some sort of a strategic element.

- *Travel demand management(TDM):* These types of actions often involve multiple geographic areas, numerous agencies, and of course intelligent transportation systems. A number of areas have already prepared ITS strategic plans, or early deployment projects, that include a heavy TDM element. These are to be done not independently, but within the broader transportation planning process.

- *High Occupancy Vehicle Systems (HOV):* HOV systems inherently involve numerous agencies that both own (e.g., DOTs) and use (e.g., transit agencies) highway facilities. One of the major problems with early HOV systems was that their design did not account for how the facilities would be operated and used. Therefore, these types of facilities and systems need to be carefully planned and designed with eventual operational issues at the forefront of the discussion.

- *Intelligent Transportation Systems (ITS):* In the case of ITS, we have coordinated communications issues to deal with, usually across multiple modes. Some of this coordination should come from the planning process in that ITS strategic plans take guidance from the broader transportation planning process for the long-range plan, and from other policy objectives that the region has already defined. But the ITS strategic plan should feed information back to the planning process, much like an MIS might on a geographic level. This is really the functional level of activity.

Let me end by identifying a couple of other issues that will tremendously affect operations planning and implementation. Liability has been one that DOTs have not taken lightly. As we get into areas that involve interaction of the roadway and the vehicle, the liability issue becomes an important consideration in the operational realm. In an accident, whether it is the vehicle's fault or the roadway's fault is a huge legal issue. This could be one of those issues that perhaps slows down progress in this area.

Estimating operations costs is not always easy to do. Enough information must be developed to have a credible plan. Likewise, establishing operational benefits can be a major challenge. One of the things often lacking, although I have seen some progress in certain areas, is the type of criteria that influence project selection. The traditional TIP criteria have largely focussed on capital activities. The more operations becomes involved in these decisions, we have to become more capable of incorporating operational benefits and costs into the prioritization process.

Finally, we must better control the cost of operations. This is a major area where planners can

capture some attention and show some value to this operational area. There are some areas where we can perhaps help reduce and minimize the cost of operations, again working as partners with the operators themselves. A lot of examples can be found in ITS, but some of the ideas are really more in terms of management, ways to reduce staff requirements. This might include traffic counting programs. One of the big complaints we hear about ITS is that it will only increase the cost of doing business. So where are we going to find the money? We need to find ways to minimize the cost of any additional operational activity and use operations creatively to reduce costs where possible. In addition, ITS actions can provide information that will allow planning activities to be done more efficiently.

Ultimately, what drives any program is what makes taxpayers and voters happy. This is one of those areas where ITS and other operational activities are hard to put your fingers on. It is easier to see a new highway lane than it is a new fiber optic cable that allows movement of information and communications. This is our challenge. As transportation professionals, we need to better articulate how customers benefit from operational strategies. After all, we are in a customer-oriented business. This is what ISTEA was really all about.

**ALAN MEYERS, VICKERMAN, ZACHARY AND MILLER/A DIVISION OF TRANSYSTEMS CORPORATION**

My talk today will focus on operating and managing transportation systems from the freight perspective. There are several trends that are driving the freight industry, not only in the United States, but worldwide.

The first trend that applies to all freight transportation modes is the impact of deregulation on the system. Because of deregulation, many formally distinct services are being integrated. From the shipping side, we see one competitor buying space on another's vessel, vessel sharing agreements, box sharing agreements and increasing consolidation of services. Importantly, there has been a significant increase in the number of partnerships in the rail and trucking industries. The private sector of its own accord and for market reasons is leading the way in the integration of intermodal services to minimize the dollar cost of point-to-point freight movement.

The most significant trend is the substantial increase in freight movement. The U.S. currently ships 967 million short tons of cargo through 185 commercial deep draft ports having 3,200 berths and 1,900 terminals served by 28 terminal railroads. This is a huge economic engine in the U.S. Growth in the seaborne container trades, and

this means containers and bulk freight that can be placed in containers, is projected to skyrocket through the year 2010. Current projections see exports growing at 6.4 percent per year, and imports at 2.8 percent per year. This combined rate of freight movement into and out of ports of over 9 percent per year over the next 15 to 20 years means tremendous capacity pressures at many U.S. seaports.

American ports are not the largest ports in the world. Put together, all of the U.S. ports are just about the size of Hong Kong. They are also not the best ports in the world, and they are not the most efficient. Some of the Asian ports are about twice as efficient on a throughput per acre basis as U.S. ports. So, there are increased efficiencies that can probably be gained in American facilities based on the model we see in Asia.

Another trend that will affect the movement of freight is the propensity to use bigger ships. For many years, a major constraint on container ship design was the width of the Panama Canal. Container ships had to be no wider than could fit through the Canal, and American ports were designed on that basis. Now what we see is something called post-Panamax vessels that are too big to fit through the Panama Canal. There are currently 16 such ships existing in the world, with 53 more on order. In a few years, we will have at least 69 vessels on the order of \$100 million per vessel plying the oceans which are too big to go through the Panama Canal. These new vessels can carry on the order of 4,000 to 7,000 TEUs per vessel (where a TEU is a 20-foot equivalent unit and a normal standard 40 foot size container is two TEUs). No crane in existence at any U.S. port can handle a 7,000 TEU vessel. These vessels will require berths much bigger than any existing berths. The deployment of these vessels in the world fleet has huge implications for the development of new terminal facilities throughout the U.S. In addition, these vessels will likely require deeper channels. A study is currently underway on the implications of these new vessels. Does it mean fewer ports? Does it mean a hub and spoke system with possibly one to three supersized port facilities on each coast serving smaller facilities with smaller vessels?

Another trend in shipping technology is an attempt to bridge the gap between standard air service which is seven days and 21-day service via ocean. What can bridge that gap? We are beginning to see something now called "fast ship" which will attempt to provide ocean service at the same speed as air cargo service. A fast ship is basically twice as fast as a standard oceangoing container vessel, has a smaller capacity, and must be loaded and unloaded with specialized technology—airlift vehicles that are rolled on and off the vessel like rail cars. This has huge impacts on

the amount of space and the type of design of landside facilities.

Inland waterways are going to continue to be important. However, we are not likely going to see the explosive growth in inland waterway traffic as we will in container traffic. We will see a growth on the order of one to two percent sustainable over a long period of time. These waterways are a key part of the national transportation system.

Once cargo arrives in a port, it must be moved inland by truck, rail or water. Inland distribution of cargo is the key driver of landside traffic concerns associated with ports. In 1984, we had one double-stacked train set between Los Angeles and Chicago. In 1989, we had 114 train sets; by 1993, this had reached 241 train sets. We have seen explosive growth in the use of intermodal rail. In 1987, LA/Long Beach was moving about 15 percent of its cargo on intermodal rail. In 1989, it was close to 50 percent. The great thing about intermodal rail from a terminal operations perspective is that with intermodal rail you can move cargo out of the terminal in about half the time. By so doing, you effectively double the throughput capacity of the terminal. In addition, you shift movements from truck to rail, and without dock rail it reduces the travel distance that a container has to move from the terminal to the rail head. If you can provide direct rail access to the dock, you can eliminate drays through your local communities potentially solving congestion and safety problems.

One of the impacts of intermodal rail service is that U.S. railroads are reducing the number of intermodal terminals they operate and are building more of a hub system. One of the problems that intermodal rail has caused on the transportation system is the need to retrofit bridges that cross rail lines to make sure there is sufficient clearance.

With all the growth in intermodalism and intermodal rail, what happens to trucks? Projections indicate that truck use is expected to increase substantially through the year 2020. There is not going to be a decrease in the amount of trucks on our systems. In 1991, trucks handled about 41 percent of the inter-city freight tonnage in the U.S. A recent study by DRI and McGraw Hill concluded that currently it is at a 47 or 48 percent level. If one considers revenue-tons, which is weighted for the value of the cargo, trucks which carried 17.9 percent of freight movement in 1980 increased their share to 31 percent in 1990.

The other interesting thing element of freight movement is that associated with air cargo. In 1980, air cargo accounted for 0.1 percent of freight movement which is a very small percentage. However, by 1990 it had reached 0.3 percent. So although air cargo is a small share

of the market, it seems to be growing rapidly and Boeing predicts that it will triple over the next decade and a half.

Having given a context for the future of freight movement and showing the challenge that such movement will mean to the nation's transportation system, what are states' roles in the freight movement system? Their role is critical. The activities associated with the movement of freight can be divided into facilities and connections. On the facilities side, there is ownership, development, operation, and maintenance of airports, seaports, truck and rail facilities by states. On the connection side, it's ownership, development and operation of the navigation channels, highways, and rail connections by states. The federal government is a major stakeholder in this because they own, operate, and maintain a lot of intermodal facilities, particularly in the military. States often have port authorities that centrally manage the facilities of their seaport systems. They operate beltline railroads in a lot of cases. In other instances, states will operate ports, but through chartered state port authorities rather than the DOTs. The most common structure for port management is through local and regional authorities. However, private operators can play a significant role as well. A recent study in Savannah, Georgia, concluded that about 40 percent of the waterborne commerce used facilities provided by the state port authority and 60 percent was associated with private facilities located along the Savannah River. So, in a state that was dominated by a state run port authority, the state was not even the single largest provider of terminal storage capacity.

I think Florida's experience with statewide freight planning is really ground-breaking. This effort inventoried freight facilities to determine such things as, what modes connect to these facilities? what types of linkages are available? is there double stack clearance? what is the condition of the infrastructure? are there pedestrian access needs? what is the linkage distance to the national highway system and to other modes of interest?

Scoring criteria were then used to assign points to the attributes of the system.

The State of Oregon has used performance measures at both the system and facility levels. For example, you might look at facility capacity in terms of the percent utilization; accessibility in terms of operating hours, connectivity, and the availability of connecting modes; delay experienced by freight moving in and out of the facility; and safety. Oregon has tried to integrate performance measures and data collection on facility operations into a prioritization model which will make comparisons and judgments about the highest priority needs. This effort will also serve as a database on general information about freight facilities.

California is also developing similar types of performance measures both system wide and facility-based, and is integrating these into a large database management and analysis system. The database management system is being distributed now to MPOs in California for their use. Performance measures are defined for passenger transportation based on existing data. Performance measures for freight have been defined, but have not yet been integrated into the analysis package. One of the key issues is the need to disaggregate commodity flow data from a county level to a corridor level. For example, some movements between Orange County and LA County have six major corridors between them. Figuring out how much of the county-to-county movement is assignable to each corridor is a very substantial undertaking.

Using operational information to minimize the need for capital investment is clearly the direction for the future. Information technologies can be applied in a couple of different areas—facility operations, managing access to the system, user and customer decision support, and finally planning and prioritization. Intelligent collection and utilization of data is the key to these planning efforts. There is a lot of data out there. It is just a case of using the least data the most intelligently. We did an inventory of about 20 different information technologies as they might be applied to freight facility and access systems. In looking at port facilities, or any kind of intermodal freight facility, different components of the facility govern how efficient it is going to be. An ocean terminal will be governed by the capacity to accommodate vessels, to store cargo within the terminal and to move cargo out of the terminal by intermodal rail or truck through a gate. The key is to optimize the capacity of each of those access/egress points so that we are not overinvesting in capacity that is not needed. A terminal at the Los Angeles/Long Beach port complex is a good example of how to optimize for flows. The terminal was designed to accommodate very major queues that build up during the day. Simulation modeling was used to optimize the design of the facilities based on flows in and out.

Planning for inside the terminal versus outside is a critical concern for states. Are they going to become more involved in planning the inside of terminals? It has historically not been their purview, but as they become increasingly the owners and operators of systems, are they going to have to be involved in private facility operations inside those terminals?

Finally, partnerships among public entities are a vital element of freight planning because so much of freight movement is not under the control of DOTs, but instead under control of regional and local authorities. Florida

has led the way by establishing a Florida Ports Council. Other efforts are underway. Public/private partnerships are also critical. Many private freight industry groups are modally oriented. We need to bring all freight interests together to determine what is the most appropriate policy for the nation. Efforts like the Freight Stakeholders National Network is an example of what needs to occur. Under one umbrella, freight interests could possibly speak with one voice concerning their needs and requirements, and perhaps even establish a consistent and consensus-oriented freight planning agenda.

## QUESTIONS

1. *Given the resource constraints that we are struggling under and are likely to be for some time, and given at the same time the pressure for provable transportation investments that affect economic development do we need to be building into our statewide planning and programming processes some greater priority to something that you could call a short-range perspective. Do we need a separate short-range planning process? Do we need strategic*

**Conference Participant:** I often get frustrated with the abstractness of many of our planning processes as compared to the nitty gritty stuff and to the opportunities to gain economic advantage in a demonstrable short-term way, particularly on the freight side. With some notable exceptions, such short-range and more immediate issues have been weakly pushed in the current round of planning. Maybe this is an unfair characterization, but I don't think operations issues that arguably can provide some significant benefits from the perspective of system operations will get a fair hearing in today's planning process.

**Conference Participant:** Operations and planning are not strange bedfellows. If you look at the real time information systems that are needed to operate a system and to continue to improve its operation, these are the same types of information you need for planning. It is part of the long-term and short-term perspective on improving our transportation system. I deal a lot with folks in the trenches. These folks have responsibilities, and constituencies they are trying to appease and still get the job done. To them, planning is always getting in the way. If we can figure out how to make the information that they need a bit more accessible or relevant, we will go a long way to better integrating operations and planning.

2. *If operational problems are responsible for say half of the delay in metropolitan transportation freight or passenger*

*movement, does the way we approach planning and programming under ISTEA make sense? Are we involving the parties that you have to in order to have any impact?*

**Conference Participant:** We have a longstanding incident management program as part of our systems operation management system. Law enforcement agencies are involved in this as a partner in the network. The idea of better linking operations and planning requires that such institutional linkages occur as well. We are going to move more into operating our transportation system and thus we need different skills to do that than we did to build the system. The planning process is now going to have to be more focused on the operational aspects of system management. I do not think this will be a problem, because the planning process helped everybody come to grips with the reality that we couldn't build our way out of congestion.

**Conference Participant:** We are now in a financially constrained planning and programming environment. Some elements of ITS will allow us to be more efficient, and are going to allow us to do a better job with scarce resources. Therefore, we must figure out a way to better incorporate these operational issues into planning. We need to be concerned about identifying the best format for bringing representatives of operations agencies into the process. There are certain formats where individuals important to operations planning feel comfortable and fit in. Then again, these same formats might not be comfortable to others. For example, not too many highway patrol people are comfortable in a planning environment, but there are other environments where we can bring them in, have them contribute, and bring all this input back into the planning process.

**Conference Participant:** Transportation planning used to be really traumatic. We did it every 10 years and then it took everybody five years to adjust to what we had come up with and then we would start over. As we become more customer-oriented, we must look carefully at the organizational impacts of having a planning, programming and finance process that is more open to our customers. The expectation is that you pull all the stakeholders together and they will participate in the discussions the precede the development of the plan. So, there is a different way of doing business now which inevitably begs the question of whether we are organized correctly, the inevitable centralization and decentralization issues. We have taken some very dangerous steps in decentralizing our investment process and are in the process of discussing

how much authority and responsibility should be devolved to districts.

**Conference Participant:** Our DOT is viewing the provision of services and operations as being separate and different from the infrastructure part of what the department does. A lot of what we do, e.g., transit and also maintenance operations, is a service that affects our customers in a way that is different from the construction of infrastructure. So, in my planning organization I have a unit now called transportation services development where we do the planning for transit and we have a group whose intent is to interact with private organizations. Some of the things that we have to pay attention to include the effect that our activities have on users of our transportation system. Our provision, maintaining, and costing of the highway system affects the truckers considerably, but that is their livelihood. In return, the truckers support the economy so we need to think carefully about how we affect our customers. If we introduce unpredictability in their trucking schedules, it affects their ability to do business. Those people often don't call to complain, they just go somewhere else if you create too much of a nuisance for them. So there's a world out there that we need to pay attention to.

**Conference Participant:** In my state, we have treated our customers over the last several years in a formal way though task forces and committees. Our customer base is much broader than what it used to be. And, of course, externally, as a result of ISTEA, our customer base is much broader. So we spend a lot more of our time in meetings, we do a lot more outreach, and we make sure that our entire organization is aware of what our customers want.

**Conference Participant:** In our case, we feel that we can better serve our customers by decentralizing as many operations as possible. We are very decentralized in project planning and other activities. Operational decisions are made at the district level. Programming is done at the district level. The district planning director is equivalent to the chief engineer at the district level which is a reflection of how much importance we place on planning. The responsibility for statewide planning is in the central office, but the development of the state plan is done through a process centered on the districts.

**Conference Participant:** We are also in the process of decentralizing in our major metropolitan areas. We have dedicated district staff to coordinate with the MPOs on a day-to-day basis. We are using our regional planning commissions at the district level to identify regional

priorities. These commissions are not regional transportation planning organizations, but rather broad-based economic groups. We are also setting up customer service centers specifically to deal with customer relations in all of our district offices and to gather data on customer desires, wants, and needs.

*Conference Participant:* One of the things I am noticing in my state is the explosion of new ideas and new approaches to planning. We want to do our traditional planning better, we want to have more time for innovative partnerships, we want to be at the forefront of making our process more effective and efficient, and we want to help truckers move freight a little bit easier and faster. We want to do all sorts of things to serve new customers and to coordinate all of our actions at the state and MPO level. The unfortunate factor, in my view, is that we don't have more money to do all of these activities and I am not sure we will have any more than we have now in the future. The "new topic of the day" gets on your agenda and often reaches the top while we are still responsible for doing all the things we have always done—data collection, data management, analysis, and evaluation. We need to take a little broader view of our activities and push for more resources, not less.

*Conference Participant:* It is important as we think about the future of statewide planning that we consider a stronger link between operations and planning. The common wisdom is that planning agencies will not likely (willingly) promote operations plans as part of the planning process. As a matter of fact, we have some MPOs that have put their money into ITS deployment. This was a very interesting decision, particularly since it was some years ago. When we looked at the composite of the long range plans in the state, we found a lot MPOs assigning future monies for those types of operations. However, I do not think that these decisions came about because MPO board members really thought about ITS. I suspect that these priorities were the result of the technical process. So, in order to maintain this momentum when the time comes to actually program funds for these types of projects, we are spending a lot of time doing public information on the benefits of ITS methods. Public officials are not aware of the technology and the benefits. And frankly, a lot of it is because the benefits are not really clear to many of us, even when we have been in the business of running traffic management systems. It is hard to quantify the benefits.