

REGIONAL OPERATION PLANNING AND  
ARCHITECTURE (ROPA)

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**EDITORIAL FROM LA REFORMA – Defining the Current Issues**

Mexico City, as the most populated city on Earth, has contended with some of the most complex transportation problems of any metropolitan area in the world. A recent op-ed article in the Mexico City newspaper La Reforma illustrates some of these challenges and their possible solutions:

The intense and sometimes wild competition for passengers among unregulated *colectivos*, the heavy traffic of more than 3 million vehicles in congested avenues and the highly polluted air, make commuting within the Mexico City Metropolitan Area (MCMA) an intimidating experience that hinders quality of life and economic development.

One critical component of the transportation equation in the MCMA is public transportation; after all, sixty nine percent of all motorized trips take place in this mode. Half of all public transit trips take place in *colectivos*, which are small minibuses that operate like “fixed route collective taxis,” without a strict regulation from the authorities. Although *colectivos* are very flexible and provide an affordable transportation alternative for most of the population, its institutional and economic model creates many problems for the city. For instance, individuals and not transportation companies, own minibuses. Furthermore, the drivers’ salary is not fixed, but depends on the number of passengers they transport. As a result, competition on the streets is hard and driving is aggressive. Also, the lack of regulation results in overcapacity in highly demanded corridors, causing congestion and lack of service in areas where demand is low.

On the other hand, Metro and Light Rail account for fourteen percent of all motorized trips within the MCMA. While the Metro network has been gradually expanding since the sixties, this transportation mode has been losing ridership, both because of the highly unregulated competition from *colectivos*, and because of the inability of the Metro network to adapt to the growing and dynamic travel demand of the metropolitan area. Finally, city owned buses complete the picture of public transit in the MCMA. This mode, which used to have the highest share of public transit in the eighties, has fallen sharply both because of the burden of unionized workers, and the guerrilla-like competition from *colectivos* which also made this transit mode fall in crisis. In conclusion, the MCMA is depending more and more on the unregulated *colectivos* for the provision of transit.

But the increasing dependence in *colectivos*, along with the expanding number of private vehicles and the exceptionally big size of the MCMA, has resulted in a serious congestion. To address this problem, authorities have built additional capacity, which has not kept up with increasing demand. Also, authorities have implemented a demand management program called “Hoy No Circula”, which restricts the use of private vehicles for one day of the week according to the license plate

number, but critics say, this program has resulted in the increase in the number of old vehicles in the city, and, ironically, an increase in the VMT per household because of an increase in the total number of vehicles available.

To add to this problematic picture, congestion brings along the very serious issue of air pollution, which has a severe impact on the health and life quality of the population. In addition to congestion, which plays a central role in this pervasive problem of the MCMA, the fleet's age, lack of proper vehicle maintenance, poor fuel quality, and the geographical location of the metropolitan area all contribute to poor air quality in the region. To address these environmental issues, authorities have been promoting the adoption of new vehicle technology, the inspection of emissions, as well as fuel improvements.

To tackle these complex and interrelated issues, the MCMA has to overcome a series of difficult administrative and political challenges, which represent no small task. Chiefly, the MCMA is not a unified political jurisdiction, but one in which three different major jurisdictions cohabit: the "Estado de Mexico", the "Distrito Federal" and the "Estado de Hidalgo". Further, those jurisdictions can be decomposed into fifty-nine municipalities and sixteen delegations, with a total population of more than eighteen million inhabitants, more or less equally distributed between the two major jurisdictions.

In face of the complex institutional, political and technical challenges that the MCMA transportation faces, authorities must have a resourceful agenda full of innovative solutions. This is an era of great technological advance, and technology should be a central tool in addressing the many challenges that lie ahead. MCMA must consider Intelligent Transportation Systems (ITS) for a systems strategy that would enable the metropolitan area to develop coordinated actions for addressing Mexico City's specific transportation needs. Mexico City should start by developing an architecture that defines the relationship, the shape and the building blocks that enable the development of an integrated solution to the transportation problems in the MCMA (La Reforma).

## **DEFINING THE EXISTING ARCHITECTURE**

As the op-ed advocates, various institutional changes are necessary to effectively resolve the complex transportation issues and externalities the region is facing. Yet, undertaking such bold reform measures requires an understanding of the present architecture, which is so aptly described in the following quote: "Transportation services are provided, regulated, and operated by different institutions with different goals and organizational structures, which results in a fragmented transportation system,

physically and operationally in contrast to transportation demand, which is continuous and metropolitan” (Ortiz Mantilla 57).

The MCMA is currently composed of 10,437 km of roads, 89% of which are located in the DF and 11% of which are in the EM. More than half the vehicle trips are between the EM and the DF. There is a limited metropolitan legal framework, and the DF and EM differ both physically and operationally, making transportation between the two hard to plan, manage, and making it difficult to maintain efficient standards. The differences in transportation infrastructure—technological and planning capabilities, access to resources, structural, organizational, and legal frameworks of the DM and EM transportation authorities make it difficult to have an effective metropolitan transportation system.

### ***Planning Institutions***

The DF and the EM each have their own planning institutions and there is also a separate federal planning institution. In the DF there is the Secretariat of Transportation and Traffic or SETRAVI, while the EM has the Secretariat of Transportation or ST-EM, and at the federal level is the Ministry of Communications and Transports or SCT (see Appendix A). The metropolitan institution in charge of transportation planning in the MCMA is the Transportation and Traffic Metropolitan Commission or COMETRAVI.

COMETRAVI has representatives from SCT, ST-EM, DF, and the different entities related to transport and the road network. The presidency alternates between the EM and DF every three years. COMETRAVI has minimal internal operational and technical abilities and had to hire an external consultant to conduct a study on Integrated Study of Transportation and Air Quality. Members of COMETRAVI are representatives of other MCMA authorities. Essentially, this entity is a “virtual organization” without any personnel and official facilities.

### ***EM Transportation***

Transportation in the EM sector is managed by two separate Secretariats. The first is the Secretary of Communications or SC-EM, responsible for management and regulation of private transportation (e.g. colectivos and taxis). The second is the Secretary of Transport or ST-EM, responsible for management and development of primary road infrastructure. Furthermore, the Metropolitan Coordination Secretariat or SCM was created to “promote metropolitan agenda”.

### ***DF Transportation***

In the DF there are 3 decentralized public institutions to manage transportation in the area with the SETRAVI providing the major planning guidelines (i.e., the SETRAVI is in charge of transportation analysis, planning, operations in the DF, regulating and supervising public and private mass transportation). The STC-Metro is in charge of the metro, the STE is in charge of the trolleybuses, light

rail, some bus functions, and the RTP is focused on transportation in specific areas, in particular on low-income population sectors.

There are a number of other separate transportation organizations under the DF involved in operations. The Secretariat of Public Security or SSP is essentially a police force that is responsible for fostering the safe and orderly movement of passengers and vehicles in the DF. In particular, it has functions of optimizing traffic control while enforcing the district's traffic laws. The Secretariat of the Environment or SMA is responsible for enacting the *Hoy No Circula* (HNC) program which regulates the number of cars on the road on a given weekday by enforcing "No Driving Day" for vehicles with odd or even numbers as the digit on their license plate. The Secretariat of Public Works and Services or SOS is responsible for planning, programming, building, supervising, controlling, and operating the projects related urban development.

### ***Metropolitan Level***

The Low-Medium Capacity Transportation Modes Institutional Organizations is in charge of taxi organizations and *colectivos*. There is no formal taxi organization in the MCMA, although there is a taxi union in the DF. More than 4 million drivers commute by the means of *colectivos*. *Colectivos* operate under an umbrella organizational structure, in the DF there are 21 umbrella organizations and 103 registered route associations that operate about 887 branches. In the EM there are 11 umbrella organizations and 172 route associations and 94 companies. Interaction between *colectivo* organizations within the umbrella structures is extremely limited, and more critically, communication between the umbrella organizations and the government is not direct owing largely to the personal interests of umbrella leaders.

The Modal Transference Centers or CETRAMs are hubs that serve as a location for passengers to transfer from mode of transportation to another. Of the forty-six CETRAMs, twenty-three of them are managed, while only thirteen are supervised, and the remaining ten are not regulated in any way. Demand has exceeded capacity in most of these centers.

### **Linkages among Institutions**

The institutions and transportation agencies of the MCMA are characterized predominantly by inadequate flows of information and resources. This is a greater problem in the EM than the DF. Moreover, flows between the two jurisdictions are poor as well. For example, many of this state's operational agencies such as ST-EM and its Public Works agency, lack formal links to their counterparts in the DF like SSP and SOS. Moreover, there are insufficient flows of information between *Colectivos* as described in the previous section.

Nevertheless, there are some positive trends, especially on the planning side. COMETRAVI, for instance, has formal links with SCT, ST-EM, and SETRAVI. On the other hand, since this organization

lacks certain critical assets such as personnel or official facilities, resources tend to flow into rather than out of COMETRAVI. By the same token, institutions in the DF interact more within their jurisdiction and even with other organizations in the region. The federal agency, SSP, has considerable ITS resources at its disposal for the DF, and this has resulted in greater linkages to other organizations. For example, SSP is currently partnering with SETRAVI and the newspaper El-Universal to host a website updating customers on traffic conditions on the MCMA roads. Moreover, SSP maintains a “Traffic Detection and Surveillance Center” providing data that can be accessed by other institutions such as SETRAVI.

### ***Agreements between Organizations***

For the most part, agreements between the various organizations of the MCMA are not well established, although in the DF they tend to be more formal. With COMETRAVI, for instance, this institution can only facilitate agreements, which are non-enforceable, among the various planning agencies of the region. Alternatively, Colectivos lack a “formal business structure”, but some operators achieve agreements with their competitors through route associations as described in previous sections (Gakenheimer 15).

Within the public sector of the DF, agreements tend to be more formal and legally binding, especially on the operations level. SETRAVI, for example, can establish guidelines and regulations upon the various agencies it manages such as STC-Metro, RTP, and STE. Likewise, SSP, as the institution of the DF charged with the responsibility of enforcing laws established by SETRAVI, can impose these regulations on the organizations within its jurisdiction. In the EM, however, the laws are separate from the DF and can lead to difficulties for those traveling between the two states. In fact, of the 30 intersections the COMETRAVI classified as the most problematic in the MCMA, the majority were at the boundary between DF and EM.

### ***Levels of Authority***

In the transportation planning process, levels of authority among the relevant institutions are more clearly defined. At the MCMA level, COMETRAVI is the lead agency in planning, but as mentioned above, can only advise the institutions it oversees. The federal government agency, SCT, also plays a critical role establishing the “policies and standards” for the MCMA planning institutions. In the DF, SETRAVI has the greatest authority in the transportation planning process, while in the EM, ST-EM commands a similar position. Neither institution, however, has control over every transportation organization involved with their states.

### ***Decision Making Hierarchies***

Authorities may be clear, but decision making hierarchies tend to be fractured and not oriented towards efficient operations. The responsibilities are spread across numerous organizations in separate bureaucratic structures. In the DF, for example, the STC-Metro manages the subway while the RTP controls the bus network, complicating the coordination between the two. Decision-making is also difficult given the geographical and political division between the DF and EM. Strong leadership at the top levels of regional government for better regional coordination could filter through the bureaucracy, forcing agencies wary about working with each other to cooperate more. Unfortunately, this leadership is lacking from the governor and mayor due to political considerations. The two jurisdictions are represented by two different parties and increasing regional coordination could lead to one party gaining a political edge.

### ***Organizational Capacity***

There are agencies intended to promote regional coordination such as COMETRAVI, but they tend to be advisory and with no binding powers. COMETRAVI is a virtual organization for transportation planning and relies on the EM and DF to provide resources and to enforce any recommendations it makes. With these constraints, COMETRAVI has produced limited results.

Another barrier to cooperation is the unequal distribution of resources between the DF and EM. The EM is home to 45% of the MCMA population but receives 17% of the funding. The result is limited capacity in the EM relative to the DF for effective transportation planning and operations, despite 43% of all trips either originating or ending in the EM. This has led to political conflict between the DF and EM over the distribution of resources. If resources were distributed more equitably between the two jurisdictions, leading to greater organizational capacity in the EM, cooperation may be easier to attain. Achieving this redistribution would require incredible political maneuvering, though.

### ***Regional Capacity***

All of this results in a region with a low capacity for regional control strategies. Agencies often have few resources for regional activities. Elected officials are aware of the problem but their actions are complicated by political considerations. Their first goal is to retain power and regional coordination may erode their power. Comprehensive regional operating and ITS architectures would provide the most technically effective solution but its political feasibility is questionable. A regional architecture that respects autonomy may be a more promising solution, especially if it can obtain resources independently of the DF and EM governments.

### **A Proposed Organizational Architecture**

To expand the capacity of MCMA in tackling its numerous transportation challenges, all stakeholders must work together to develop a new Regional and Operations Planning Architecture

(ROPA) for their metropolitan area. Part of this strategy entails modifying the existing institutions at the DF, EM, and MCMA levels. Revised missions along with the expanded linkages among the agencies will be necessary in this new organizational architecture.

The MCMA cannot rely solely on changing existing organizational roles to achieve regional operation coordination. Two new organizations are proposed to answer the need of regional operations. The first is an organization to act as a coordination forum for organizations in the DF and EM and regulator of the colectivos. The second organization supports the first in its mission to regulate the colectivos by providing a centralized fare collection service, a mission that will be described shortly.

### ***The Mexico City Metropolitan Operations Organization (MCMOO)***

The primary mission of the MCMOO is to be a place where the operating agencies throughout the metropolitan area can come together and coordinate operations, similar to TRANSCOM in the New York metropolitan area. Given the tremendous fragmentation in operational responsibilities throughout the DF and EM and the sensitive political issues, an organization with strong powers is not feasible. A new entity designed to facilitate operations cooperation is more politically feasible and can be used to integrate institutional practices over time as DF and EM become used to working with each other. The initial set of agencies that will coordinate through the MCMOO is COMETRAVI, SETRAVI, SSP, ST-EM, and SC-EM.

MCMOO will also serve an important role in information management. It will be responsible for managing technology standards in the MCMA. It will act as a backup data repository for the DF and EM operating agencies. The agencies will send a copy of their data to the MCMOO offices where it can be viewed by other agencies. MCMOO can then use the data to work with COMETRAVI on regional transportation planning. With this data, MCMOO can coordinate the development of future ATIS applications such as a 511 system, greater use of VMS, and even a website, improving the customer focus of the transportation system. This will not be a major focus at the outset, though. MCMOO will have plenty to do just getting the operating agencies coordinating in an effective manner.

The second function of the MCMOO would be to regulate colectivos. As has been described earlier, colectivos have the highest mode share in the MCMA and are currently poorly regulated, leading to congestion, safety, and pollution problems. Assigning this responsibility to MCMOO would reduce the ill effects of colectivo operations and could take place regardless of the success of MCMOO as an operations coordination forum. Since attempts to coordinate regional planning in the MCMA have fared poorly it will also be difficult to succeed in operations coordination. Nevertheless, based on a similar program executed in Bogotá, Colombia where colectivos were causing similar problems, the MCMOO success would depend on the political will to pursue its intended mission.

The first task in regulating colectivos is to reorganize the industry. Rather than allowing colectivos to operate freely, they would have to organize into companies that would bid on routes offered by MCMOO to alleviate the under-servicing of low demand areas and over-servicing of high demand

areas. Customers will receive more extensive metropolitan-wide service with the route assignments. Along with this reorganization will be a technology upgrade requirement. The colectivo companies will be obligated to purchase new low emission vehicles equipped with GPS devices. With vehicles transmitting their location to MCMOO for informational purposes, this can serve as the foundation for future ATIS services. MCMOO can help arrange loans between the colectivos and banks to upgrade vehicles, but it is not expected to provide the loans.

A final mission of MCMOO would be to supervise and coordinate the development of the colectivo farebox collection system. MCMOO will attempt to convince colectivos to switch from gathering money directly from the passengers to using a smart card system. Passengers would pay for trips using the smart card before they even board the vehicles. The smart card would also be compatible on public transportation and perhaps for other transactions, increasing the convenience of these non-single occupancy vehicle modes. Instead of being paid according to the number of passengers carried, colectivo drivers would be paid according to distance traveled as part of the route they were awarded. This should reduce the aggressive driving and concurrent accidents. By reducing the non-recurring congestion caused by accidents, regional traffic flow will be improved.

### ***Colectivo Farebox Collection Company***

An important consideration in implementing the plan is having a privately owned, independent entity in charge of the fare collection. This would be important, as can be learnt from the experience in Bogotá, where colectivo operators feared that if fares were placed in government hands, the government would siphon it off to other purposes and they would not receive their full compensation. This was resolved by creating an independent, neutral company to handle the funds. In the MCMA, all fare money would go to the private company, which would place it in a trust fund to be redistributed according the trust's charter developed by MCMOO and representatives from the colectivo industry. A small, set amount of the funds will be given to MCMOO for funding which will strengthen it and give it some independence from DF and EM politics. This financial arrangement should alleviate some of the colectivo operators' worries about government appropriation of funds and contribute to the adoption of colectivo regulation.

### ***Changing Existing Institutions***

With the new organizations of MCMOO and the Colectivo Farebox Collection Company, existing institutions will need to be modified in terms of their missions and linkages to other agencies. Eventually, these changes can better facilitate the necessary information and resource flows to make transportation in the MCMA more responsive to customer needs.

Overall, most of the changes with the EM agencies will be directed towards its lead regulatory and planning agency, ST-EM. First, this organization should takeover the other planning institution

SCM since “promoting the metro agenda” seems to be most appropriate for ST-EM, which is the agency most familiar with the state’s transportation needs.

Secondly, ST-EM must become more heavily involved in transportation operations. In particular, one of its primary roles should be to deploy and manage ITS technologies within the EM such as road based sensors and traffic signal controls to implement ATMS. As part of this effort, ST-EM should set up an incident detection system throughout the state. To provide customers with the most rapid responses in the event of traffic accidents, this ATMS technology should be linked to the EM Security Agency for emergency services. Moreover, partnerships should be formed with private companies such as cell phone carriers, health care providers, and tow-truck operators. This would have the benefit of not only clearing the roads more quickly after an accident, but also would better ensure that medical treatment is delivered within the “golden hour” (Horan 69).

Finally, the other secretariat in the EM, SC-EM, should also be reoriented in its mission to work more closely with certain organizations in the DF. Since this agency is involved in charge of mass transportation, the SC-EM should develop links to such DF transportation agencies as BRT or RTP should these bus systems extend into the EM.

### ***Changing Existing DF Institutions***

Similar changes with transportation operations should be extended into the DF as well, although these transformations will be more complex due to multitude of agencies in the Federal District. Perhaps of all the DF agencies, SSP will be most impacted by this new regional architecture. First, like ST-EM, this institution should become more active in deploying ITS since it already has a significant cache of these technologies. For one thing, SSP can make its VMS technologies available to CETRAMS. With such information displays, customers will become more aware of their arrival and departure times for their connections, thus enabling transfers to occur more seamlessly at these intermodal centers. For another, ATMS should be implemented by this organization as well. As with ST-EM, SSP should maintain a collision detection system that perhaps could be operated by its already existing Traffic Control Computerized Center (TCCC). Moreover, similar partnerships with the private sector should be forged to ensure rapid responses to customers in the event of traffic accidents. Finally, with the more automated and extensive data collection system of ATMS, SSP should make this information available to the ATIS operations of MCMOO.

Other organizations of the DF must establish new links as well while strengthening their already existing connections. SOS, for example, should work more closely with SSP by sending its daily construction schedules to the lead traffic control agency in the DF. In turn, SSP can then forward this information to MCMOO to determine whether the roadwork will impact the overall traffic flows in the region.

On a more internal level, the agency SETRAVI should be granted a new responsibility: to develop a program of congestion charging. Since this institution already works in both planning and operations for the DF, implementing and administering such a program would be appropriate for its existing roles. Congestion pricing that utilizes Electronic Toll Collection (ETC) should be deployed in the most heavily congested zones and corridors of the DF. Drivers entering these sections will have to pay a set daily fee, which will be collected by the Colectivo Farebox Collection Company (described under the new institutions above). In the future, this toll could be adjusted with the current level of traffic and the amount of air pollution generated in the region.

With a system of congestion charging in place, SMA should then abandon its highly ineffective “Hoy No Circula” program. Already, this plan, intended originally to reduce VMT, has contributed towards increasing miles traveled of autos overall, especially among higher emission vehicles. Instead, SMA should be more focused on collecting and monitoring data on the air quality within the DF. This information could then be provided to MCMOO and SETRAVI, which may utilize this data in the future to set congestion pricing tolls.

Finally, with the establishment of MCMOO, the metropolitan institutions SCT should work more closely with this MCMA operations agency. Information should flow both ways among these organizations with SCT providing standards that influence MCMOO functions while receiving feedback from MCMOO on the effectiveness of its planning guidelines that affect regional operations.

The same type of feedback system should also be fostered between COMETRAVI and MCMOO. Such a relationship could better ensure that the proposals of the metropolitan planning organization such as the “design of transportation metropolitan routes” or plans to control pollution are compatible with the operations of the MCMA transportation system (Ortiz Mantilla 48).

### **Customer-Centric Architecture**

With these transformations among existing institutions and the developments of new organizations, the proposed ROPA facilitates a more customer oriented approach throughout the MCMA transportation system. In the first place, information systems are utilized to a greater extent. With organizations such as SSP providing VMS technologies at CETRAMS, this can help fulfill a customer needs for greater predictability and reliability in their travel times, and thus reducing traveler stress considerably. Moreover, MCMOO is serving transportation users with the establishment of the data repository. This system could potentially offer such ATIS services as websites with customized travel information for MCMA commuters or traffic alerts that can be transmitted to customers’ cell phones.

In addition to helping the customer make better decisions, the new regional architecture will foster a greater focus on safety. In particular, the incident detection systems that ST-EM and SSP will deploy encourage a more customer centric approach on the welfare and mobility of the network users. After all, success of these technologies will depend on the rapid detection of accidents by the sensors and the quick response of authorities to assist those travelers harmed by the event.

High levels of service will have to be maintained in non-emergency situations as well. With the SETRAVI's congestion charging system, this market based-approach will require the institution to provide customers a return for their investment. In other words, the zones or corridors drivers pay to use must offer reduced travel times and lower traffic volumes over the normally congested non-tolled routes. With public transportation, the SMART card fare payment system will further advance the customer oriented approach of the new architecture. This technology of APTS should provide greater convenience to the majority of users who rely on public transit and who make intermodal transfers at the CETRAMS.

Perhaps the view of the customer is most accounted for in the institutional reforms directed towards Colectivos. With a mode share that is nearly double to that of private autos, these “fixed route collective taxis” are clearly the most popular means of travel around the MCMA (Gakenheimer 9, 14). The proposed ROPA is likely to considerably enhance the travel experiences for the millions of passengers riding on Colectivos. Part of the mission of these newly established organizations, MCMOO and the Colectivo Farebox Trust Company, will be to establish greater levels of safety, reliability, and accessibility for the customers utilizing this critical mode.

#### **Benefits and Potential Weaknesses of New ROPA**

Partly attributed to this more enhanced focus on the customer, the new architecture creates several benefits over the existing organizational arrangements. Currently, there is limited communications between operating agencies but the new architecture will open these information channels that could ultimately enhance operations.

Public transportation services such as colectivos, which the region depends on so critically, will improve in several ways. The coverage provided by colectivos will be more balanced region-wide since the payment incentives will no longer be based on the number of passengers carried. The new arrangement will offer cross-subsidization between the high income and low income routes. Moreover, the new fare structure will also reduce the incentive for colectivo drivers to act so aggressively. In turn, this will improve safety and reduce non-recurring congestion.

Furthermore, the universal ITS architecture developed for the MCMA will increase system interoperability. This may take some time, however, since the SSP has already procured several technologies that may be not be compatible with the newer systems deployed elsewhere in the MCMA.

#### ***Potential Weaknesses***

With such challenges as achieving region wide interoperability of technology, the proposed ROPA may have potential drawbacks. There are several areas where work will still be needed. It should be noted that these weaknesses may also exist in the current MCMA situation but they are items that should be resolved in the future.

Implementing the institutional architecture will be complex in establishing the necessary linkages among organizations. With the multitude of agencies involved in operations in the DF and EM, coordinating their activities may require considerable overhead. Perhaps some organizations may be less amenable to cooperating with their counterparts. Such barriers may subside as the agencies become used to working with one another through the partnerships that MCMOO will require.

Human resources could be a potential problem as well. The new functions of the proposed architecture will not only require “skilled specialists” that can understand the new technologies, but also “broad generalists” who can grasp the institutional, system wide issues that affect ITS deployment. The capacity of the local agencies to perform the necessary functions could be limited if they do not have the resources to hire the needed expertise.

This plan is optimistic in its assumptions about the willingness of agencies to work together. This may not be the case as agencies could view their counterparts as competitors or they may be resentful of the resources available to other agencies. The plan also requires the sustained commitment of these agencies to coordinate operations. A difficulty is that MCMOO and ITS could be heralded as a solution to the problems at the beginning of the plan but support fades as its position drops in the list of priority projects.

If political issues are too intractable, ITS projects can be scaled down according to the architecture. Success can be demonstrated in phases to garner further political support. For example, SETRAVI might implement congestion pricing on a few highly congested corridors initially. Similarly, MCMOO could introduce the SMART cards on a limited number of public transit routes before deploying this ITS technology throughout the entire network. The MCMA organizations should demonstrate some initial successes with these new programs before advancing further in the ROPA plan.

Funding is an issue that has been glossed over in this plan. ITS technologies will require funds for their installation and the EM, where there is much lower penetration of ITS technologies, has fewer resources. Perhaps some of the money from colectivo operations that is funneled to MCMOO could be used for these needs. In addition, private companies could receive contracts from the government to build and operate some of the ITS systems like congestion pricing.

Meanwhile, a public awareness campaign could be initiated, especially when the architectural and technology enhancements positively impact transportation services. Of course, ITS may not grab the attention of the public with infrastructure projects. Even in the United States, where computer ownership and internet access rates are much higher than in Mexico, many of these ITS technologies do not resonate with the American consumer. Faced with such a challenge, the MCMA transportation agencies may be unwilling or unable to fund a public relations campaign.

Nonetheless, the prospects of success for the new ROPA could be enhanced by adopting a more customer centric approach within the internal operations of the organizations. Institutional performance, for example, could be evaluated through a “Balanced Scorecard” as introduced by Dr. Thomas Horan. In

this approach, customer service assessments would play an equal role with more conventional benchmarks of the organizations such as financial health or the efficiency of internal business processes. Moreover, this performance evaluation should be conducted on a periodic basis. Perhaps an independent agency could perform this assessment that might involve regular meetings with customers to survey their views on transportation services under this new ROPA.

### **Conclusion**

In the end, the near-term challenges must be overcome because solving Mexico City's transportation problems for the long-term will require regional solutions among the various jurisdictions. The proposed ROPA will help to facilitate such an approach. By establishing new agencies such as MCMOO and reforming existing institutions, a transportation system could emerge that is more responsive to its customer needs, more amenable to ITS solutions like Smart Cards and ATIS, and more effective with the public transit alternatives that it offers. In turn, such changes could contribute towards alleviating many of the problems MCMA is facing. Perhaps one day an editorial in *La Reforma* will appear that attributes major improvements in air quality, traffic congestion, and transportation safety to changes in the Regional Operation Planning and Architecture, which now benefits the lives of millions in Mexico City.

Appendix A – Current Institutions

<b>Acronym</b>	<b>Spanish</b>	<b>English</b>	<b>Role</b>
SETRAVI	<i>Secretaria de Transporte y Vialidad</i>	Secretariat of Transportation and Traffic	DF planning institution
EM-SCT	<i>Secretaria de Transporte y Vialidad</i>	Secretariat of Transportation	EM planning institution
SCT	<i>Secretaria de Comunicaciones y Transportes</i>	Ministry of Communications and Transports	federal government planning institution
COMETRAVI	<i>Comision Metropolitana de Transporte y Vialidad</i>	Transportation and Traffic Metropolitan Commission	In charge of transportation planning
SC-EM	<i>Secretaria de Comunicaciones</i>	Secretary of Communications	manages private transportation
ST-EM	<i>Secretaria de Transporte</i>	Secretary of Transport	responsible for development of primary road infrastructure
SCM	<i>Secretaria de Coordinacion Metropolitana</i>	Metropolitan Coordination Secretariat or	created to promote metropolitan agenda

Appendix B – Works Cited

1. Gakenheimer, Ralph, “Travel Demand Drivers: Mexico City, Mexico”, Massachusetts Institute of Technology, June 2003
2. Horan, Thomas, “Chapter V: Integrating the End User into Infrastructure Systems: A Customer Centric Approach to the Design and Function of Intelligent Transportation Systems”, 2003
3. Ortiz Mantilla, Bernardo Jose. Regional Planning and Operations Architectures as Means to Foster Transportation Integration in the Mexico City Metropolitan Area. Diss. Massachusetts Institute of Technology, June 2005.